MODEL AIRPLANE NEWS

THE WORLD'S PREMIER R/C MODELING MAGAZINE

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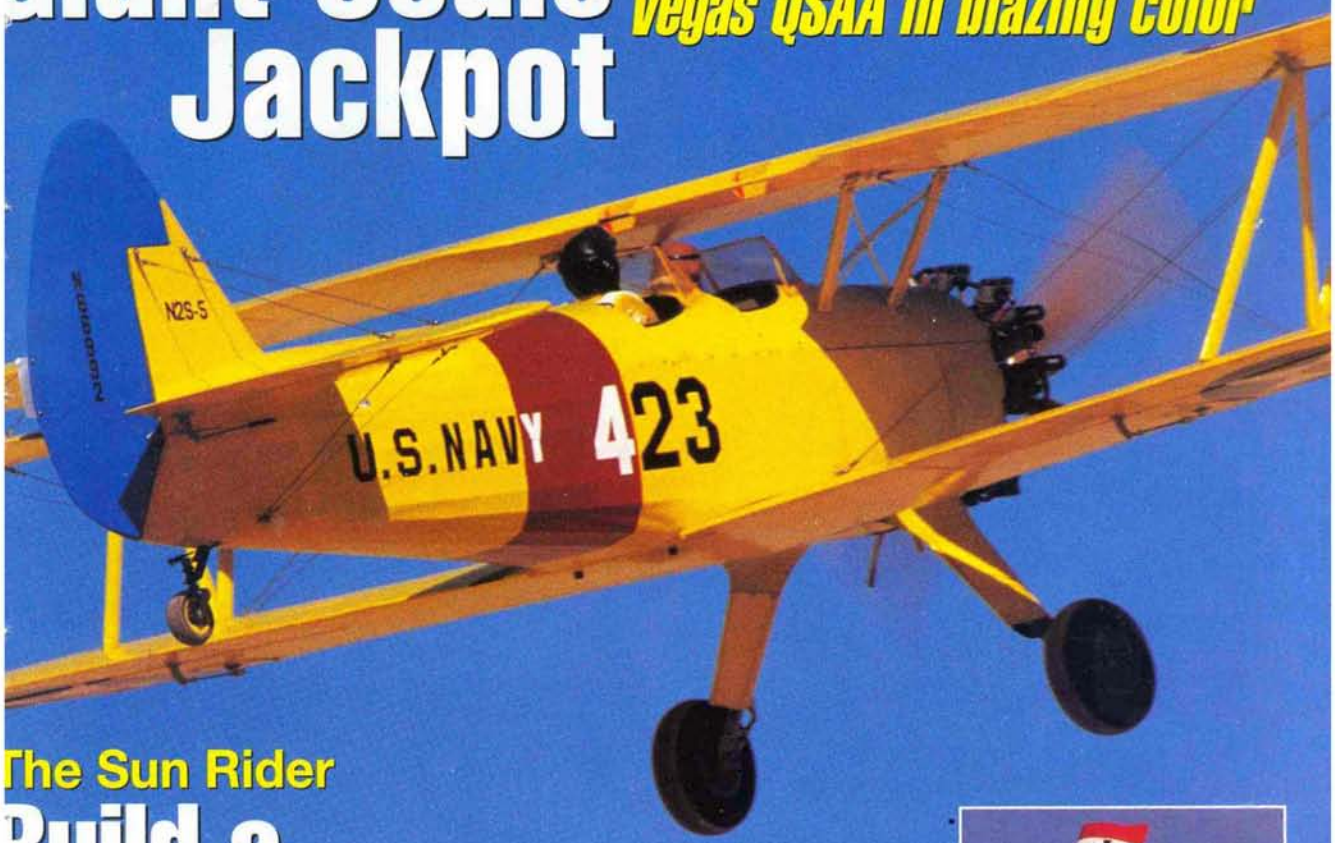
SHOCK-ABSORBING TAILWHEELS

Giant-Scale Jackpot

Vegas QSAA in blazing color



The Sun Rider

Build a Schoolyard Glider

FIELD & BENCH Model Tech **J-3 Cub**

Great Planes **Giant Aeromaster**

NSP **SkaT racer** • DuraPlane **DuraSti**

Functional Canopies made easy

Saito .56 lightweight powerhouse

July 1998

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MODEL AIRPLANE NEWS

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ON THE COVER: Bob Walker's scratch-built, 22-percent-scale N2S Stearman takes to the skies at the Las Vegas QSAA Fly In (photo by Jerry Nelson). Insets: the DuraPlane DuraStik is reviewed in this issue (photo by Walter Sidas); Faye Stilley shares his secret to building an operational canopy (photo by Faye Stilley).

ON THIS PAGE (top to bottom): the Model Tech J-3 Piper Cub ARF is as easy to build as it is to fly (photo by Randy Randolph); a proud Sandia Prep school student shows off his Sun Rider sailplane (photo by Jim Simpson); Russ Trubia's own-design Ryan STA on the flightline at the Las Vegas QSAA Fly In (photo by Jerry Nelson).

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EDITORIAL

by LARRY MARSHALL

WHAT IS A REVIEW?

I WAS TALKING to one of our ad representatives about Lanier RC, and I mentioned that I liked their larger aerobatic airplanes. Somehow this got back to Bubba Spivey, owner of Lanier. Shortly thereafter, I was talking with Bubba at a trade show. As is his style, he looked me straight in the eye and asked, "Why do you like my kits?" What came to mind was the fact that they were solid, wood kits with good-fitting parts. I also like the fact that Lanier doesn't include any hardware, allowing me to use first-class hinges, clevises, etc., as I see fit and not charging me for hardware that I would typically throw away. I also like the way Bubba designs his fuselages, as the interlocking construction speeds building time; my principal reason for building from a kit rather than from scratch.

Why am I boring you with this story? Certainly not to suggest that Lanier kits are better than those of many of Bubba's competitors; I could say similar things about many kits on the market today. Neither do I believe that my opinion about kits should matter to anyone. Rather, I've told you this story because it illustrates some important points about reviews that are worth mentioning.

First, Bubba didn't ask me whether I liked his kits better than someone else's; he simply wanted to know what I liked about his product. This is the sort of approach we take with *Model Airplane News* product reviews as well. We are evaluating the product, asking whether it does its intended job and how well it does that job. When we contract a reviewer, this is what we expect him or her to answer for you. How that evaluation is done, however, is largely up to the reviewer. This is important, as it is the reviewer who decides what and what not to emphasize. We at *Model Airplane News* provide a format that requires reviewers to answer basic questions to fill our specifications box. We require that they report on flight characteristics to fulfill our flight performance profile, and we expect basic photo documentation of the product. But the evaluation of kit construction is up to the reviewer.

The most crucial point to make about the review process, however, is that when modelers do product reviews for our magazine, or any other for that matter, they bring their expertise, their experience and their inexperience to the review process, and these things are reflected in their assessments.

This month, Randy Randolph reviews the Model Tech Cub.

Experience and expertise will affect how the reviewer assesses the product. This is especially true of model aircraft kit reviews. I mentioned that I liked the fact that Lanier kits are wood. Someone who prefers to work in foam and glass might view what I consider a "feature" as "high parts count." If most of their experience comes from foam and glass projects, they may have problems building a wood kit that I would not experience, simply because of our different preferences and/or experience with this type of product.

I like the fact that Lanier lets me use my own hardware, whereas another reviewer with a different view of hardware use might see this as something to complain about, feeling the manufacturer should provide hardware. Someone with less modeling experience than I might take issue with things I wouldn't even consider. For instance, he may not like the instruction manual. I tend to rely upon plans—not manuals—for my construction, and so I'm less likely to evaluate manuals in the same way as those who like to put check marks next to each step. Conversely, someone with more experience than I might find a product lacking in ways that I completely miss.

Because of these differences among reviewers, you should use product reviews primarily to acquire information about products. At the same time, use caution when a reviewer starts voicing opinions. The distinction between observations and opinions is sometimes difficult to discern, but it is worth the effort to try. In interpreting opinions, you should ask some questions. Does the reviewer have the same background as you? Are his priorities the same as yours? What about his needs; are they similar? Sometimes you'll be able to answer these questions, sometimes not. But at least by asking the questions, you'll have half a chance at interpreting the reviewer's opinions in a way that can serve you.

WHAT'S IN THE ISSUE?

This month, Jerry Nelson brings you the results of some fine camera-pointing at the QSAA's annual meet in Nevada. Once again, Jorg Vogelsang made the trip from Germany to show us the results of his fertile mind and superb modeling skills. This time he brought a twin-turbine ME-328, an experimental jet developed near the end of WW II.

Our construction/plan presentation is a bit different this month. Jim Simpson presents not only his design for a simple, entry-level sailplane but he also tells us about a program he's involved with that gets young people started in R/C. Hope you like it.

AirSCOOP

by CHRIS CHIANELLI

Toledo 98!

The products you see here were, in my humble opinion, some of the highlights of this year's Toledo Show. Of course, there are lots more I want to show you, but I just ran out of space. So, next month, watch for even more new releases. It's interesting stuff like this that makes our great hobby so much fun.

IT'S FINALLY HERE!!

1.80X

After some design refinements, Enya's 1.80X is finally available. Considering Enya's long reputation for power and longevity, this 2-stroke ABC ringed beauty should prove a favorite with the giant-scale crowd. For more information contact: Altech Marketing, P.O. Box 7182, Edison, NJ 08818-7182; (732) 225-6144.

Gold Edition DC-3

Now I ask you, is an IMAA-legal Douglas DC-3 an awesome choice to be given Top Flite's superb Gold Edition kit treatment, or what? This kit is sure to earn a smile from Golden Age and warbird lovers alike. Like all Top Flite Gold Edition kits, the DC-3 is all built up, and the kit box is filled with excellent laser- and machine-cut balsa and plywood parts.

Gold Edition CAD-drawn plans and instructions have gained a reputation for being super accurate and easy to follow, and there's no way the DC-3 will break this tradition. Its features include: heavy-duty ABS engine cowls and wing fairings; easy-to-build round fuselage, including cabin top and tail cone; I-beam/D-tube wing construction; and optional, split, wing flaps; and it comes with a comprehensive how-to manual titled "Flying Twins."

Specifications: wingspan—82.5 inches; wing area—734.5 square inches; weight—8 to 10 pounds; wing loading—25.1 to 31.4 ounces per square foot; fuselage length—55.5 inches; fin area—70.07 square inches; engines required—two .25 to .40 2-stroke, .40- to .52 4-stroke, or O.S. .30 Wankels; radio required—4- to 8-channel with six to nine servos (two high-torque, two micro). For more information, contact Great Planes Model Distributors, 2904 Research Rd., Champaign, IL; (217) 398-6300; fax (217) 398-0008.

Saito "Scale Essence"

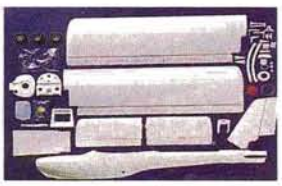
If you're like me, you love a scale-like powerplant under the cowl of your scale model—the look, the sound; I call it "scale follow-through." Saito seems to have a sixth sense about what we scale and sport-scale modelers want, and do they ever follow through and deliver! Featuring a super, scale-like, double-throw crankshaft design just like Saito's .60 twin, a new .90 twin is now offered. It has a mere 3-inch front-profile height for an easy fit into the tightest of cowls, yet according to its distributor, Horizon Hobby, it will deliver 9,500rpm on a 13x8 prop. Horizon goes on to report: "During extensive testing, our twin .90 started easily and idled contentedly at 1,800rpm without plug heat."

Just think how right those black, powder-coated cylinders and chrome-plated, Continental/Lycoming-style valve covers will look in your next scale project.

For more information, contact Horizon Hobby Distributors, 4105 Fieldstone Rd., Champaign, IL 61821; (217) 355-9511.

Pretty & TOUGH

A new company with a new and different line has hit the shores of America. The company is ARC, and the two models you see here are the Jupiter (low wing) and the Ready. These kits feature Quick Made System technology for fast assembly and are molded from a special type of ABC called "HPT." At the Toledo Show, I watched a video of the Ready being crashed repeatedly—and hard—and surviving with only a broken prop or a cracked spinner. The stuff really does seem to hold up.



As you can see, the molding process does allow some attractive detail in the model's surface. Specs for both the Jupiter and Ready: wingspan—61.8 inches; wing area—604 square inches; weight—6.17 pounds; engine—.40 to .53 2-stroke. For more information, contact Falcon Trading Co., P.O. Box 753, Hobart, IN 46342; also distributed by Z-Plane, 1659 West 98th Place, Crown Point, IN 46307.

TIGER IN THE SCHOOLYARD

Not to be left behind by the latest R/C trends, Thunder Tiger will offer a GP-07 (.069 displacement) engine for "schoolyard"-size airplanes. I don't know much about it yet; what you see here is actually a resin mock-up, but Thunder Tiger has historically followed through on its engines projects, so when I get the rest of the info, you'll get it. Meanwhile, for more information, contact Ace Hobby Distributors, 116 W. 19th St., Higginsville, MO 64037; (800) 322-7121; fax (660) 584-7766.

Fully molded Fish Bed

I've always thought the MiG 21 was one of the coolest-looking jets ever—right up there with the F-104—and DL Aeromodeles has certainly done the 21 justice.

This 1/6.5-scale MiG is 84 inches long and has a 45-inch wing that packs 844 square inches of area. While the low-aspect-ratio wings are permanently fixed to the fuselage, the fuse can be detached just aft of the trailing edge for transportation. The kit includes a total of 23, lightweight-epoxy, molded parts. Things like the front and rear fuselage sections, main top hatch (48 inches long for excellent access), wings, stabilizers, fin, nose-gear doors, main-gear doors, strut covers and main-gear access panel are finely molded. The molded ducting system includes three inlet tubes, three tailpipe tubes, a nose spike and nose-gear fairing. A complete set of vacuum-formed exterior and interior detailing parts, all the necessary wood—including machined-plywood parts—and hardware are supplied with the kit.

Also available for the MiG is a turbine conversion package that consists of specialized ducting, metal piping and plywood parts.

For more information, contact DL Aeromodeles Inc., 4500 Kimber #8, Saint-Hubert, Quebec, Canada, J3Y 8K5; (514) 445-1336.

Yellow Aircraft

New owners; new location

Yellow Aircraft and Hobby Supplies Ltd. was recently reorganized as Yellow Aircraft Intl. and is back at its previous location in Massachusetts. Yellow has always been known for high-quality products, and the new owners, Charles Tse and Chi Chen Tse, who managed the business from 1991 to 1996, assert that the company's product line will be better than ever. They say, "Yellow Aircraft will continue to improve and expand its fine products to provide the modeler with the best in engineering and value."

At the Toledo Show, they supplied evidence to support this in the form of a beautifully crafted F/A-18 fuselage (shown here with Chi Chen). The detailed molding on this totally re-engineered twin and the hundreds of molded detail parts that go with the kit were truly beautifully made. I know; I saw for myself.

Rumor has it that Yellow has other surprises in store for us. How do a 71-inch-wingspan P-47, a 1/6-scale AT-6, a BAe Hawk and a sport jet sound to you? Stay tuned to "Air Scoop" for updates, or if you can't wait, contact Yellow Aircraft Intl., 203 Massachusetts Ave., Lexington, MA 02173; (781) 674-9898; fax (781) 674-2288.

Violett Turbine Works

Over the years, Bob Violett certainly pioneered the use of micro turbines in the R/C world. And at Toledo this year, Bob and his daughter Patty (a truly outstanding pilot who can fly circles around most of you guys—and me—in case you didn't know) had more exciting turbine announcements. Their company (BVM) is now the primary sales and service dealership in the USA for Ram turbines and will handle the 500 and 750 Series, which deliver 13 pounds and 17 pounds of thrust, respectively.

According to Bob, "With a very low installed weight, compact dimensions, lots of thrust and super reliability, the Ram turbines represent an advance in state-of-the-art turbine technology." In my opinion, if a product is being added to the Violett line, we know it has been fully tested and is of top quality—end of story.

The necessary efforts are under way for the Ram units to be easily, efficiently and accurately installed in BVM's F-80, T-33, MiG-15, F-4 and Rafale B-01. A generic installation kit will also be available so Ram units can be adapted to other models.

Also of high interest was the new kerosene version of the time-tested and -proven BVM/JPX turbine, which the company has offered for many years. For more information on these units, contact Bob Violett Models, 170 State Rd. 419, Winter Springs, FL 32708; (407) 327-6333; fax (407) 327-5020.

JPX kerosene

Ram micro turbine

Digital Pressure

A neat little accessory for models with a pneumatic system is this nifty pressure gauge with digital readout. This device, exclusively from Century Jet Models, weighs in at only 0.3 ounce, is approximately the diameter of a dime and can handle pressure of up to 100psi. The unit is battery operated and easy to hook up.

The system is pressure-activated, so there's no on/off switch to install; if the readout is blank, there is no pressure in the system. It's that simple. The gauge can be installed in a model's instrument panel, or it can be used to help troubleshoot a balky retract system.

For more information, contact Century Jet Models, 11216 Bluegrass Pky., Louisville, KY 40299; (502) 266-9234.

WRITE TO US! We welcome your comments and suggestions. Letters should be addressed to "Airwaves," **Model Airplane News,** 100 East Ridge, Ridgefield, CT 06877-4606; email **man@airage.com**. Letters may be edited for clarity and brevity. We regret that, owing to the tremendous numbers of letters we receive, we can not respond to every one.

ARIZONA JET RALLY

*At the beginning of my Arizona Jet Rally event coverage (*Model Airplane News, *June 1998), I mentioned that when I went to the Spook Hill flying field, it wasn't there. Well, due to a production glitch, the words that explained this statement—and the words that talked about the new site of the Arizona Model Aviators—weren't there either! Because of this production error, the words on the second page of the article went missing. Our apologies to the Arizona Model Aviators and to all the great guys who attended the meet. The missing text is reprinted below.* LM

Not more than three months prior to the Jet Rally, the club had lost its great flying site. Undaunted, the club struck a deal with the Usury Pass Park system, and it now coexists with horseback riders, hikers and some of the most beautiful desert scenery you ever want to see. That they managed to produce 700 feet of paved runway, proper safety fencing, covered pit areas, picnic and spectator areas, and a huge parking lot, all in three months, is beyond belief. Jim Luby, the club president, talked about this miracle as though it was no big deal for the club to have done it. I guess that's what makes the Arizona Model Aviators the great host club it has been for events like Top Gun, Scale Masters, Masters Qualifiers and warbird pylon racing.

But I was there to cover the Arizona Jet Rally. The skies were clear and the runway clean; let the flying begin. This was the ninth time that Bob Ruff and Austin Goodwin directed this event, and you couldn't ask for better organizers or nicer guys to manage things. The team of folks who assist them are just great, the flying took place without incident, and the pilots had a great time.

With the wide variety of aircraft present, there was also a wide variety of aircraft flight envelopes demonstrated. I was particularly impressed by Paul Munninghoff's "demonstration" (he was just having fun) of the Top Gun F-15. Paul is a great flyer, but I've never seen a jet doing Cuban-8s in half the length of a 700-foot runway. Doing touch-and-go's without leaving that same small airspace also seemed un-jet-like. To do them, Paul had to put the aircraft into angle of attack conditions that would have done in many other aircraft. The surprising thing is that the plane flies equally well in more typical jet fashion. Paul did clean low passes, inverted as well as upright. Thanks for the show, Paul.

USRA GIANT-SCALE AIR RACING

The giant-scale racing industry is a growing group of dedicated competitors and enthusiasts. At eight years old, we are still a relatively new segment of modeling that is gathering momentum and interest through the increased media exposure we have recently received. Being recognized by *Model Airplane News* is important to the participants for the encouragement it gives as well as for the credibility needed to approach sponsors for support. You can't imagine the current of excitement that travels through the racer's network when we know a representative from your magazine is among us!

The April issue of *Model Airplane News* gave excellent coverage of the giant scale USRA World Championship Finals in Rialto, CA. Editor Debra

IN MEMORIAM
VERNON E. KREHBIEL,
MODEL AVIATION PIONEER AND MANUFACTURER

Vernon E. Krehbiel, recognized by many as "the father of scale WW I R/C model aircraft," has died after a long illness. He was 79.

As a teenager, Krehbiel built and flew his own gas-engine-powered free-flight designs. Two of these, the Challenger and the Master, were kitted and sold by Vern in 1939. As a founding member of Buffalo's Flying Bisons, he first flew R/C successfully in 1950.

In 1960, his V.K. Models began producing "quality-first" kits. Many trend-setting designs followed, including Mach I, New Challenger, Navajo, Cherokee and Cherokee Babe.

In 1968, spacious new manufacturing facilities prompted a new direction: WW I models. In this arena, V.K. Models soon became the leader in a very competitive marketplace. Popular designs included Nieuport 17, Sopwith Camel, Fokker Triplane and Corben Super Ace. Krehbiel kits won R/C scale competitions everywhere during the '70s and '80s, helping to popularize the WW I scale movement which continues today.

Dave Gierke

Sharp is as knowledgeable about the sport as she is about photography. We appreciate her talents and the distance she traveled to report on this event.

I bought all of the April issues I could find in our small town and several more at R/C Country Hobbies in Sacramento. From what other pilots tell me, the race to the newsstand was as fast as to the first pylon at Rialto!

The 1998 season includes two races in California and one in Oshkosh, WI. If any of your readers would like additional information, they may contact USRA at (281) 558-4191 or on their website: www.usra-racers.org.

Again, many thanks. We welcome you at all USRA races.

JOE MARINE
Race Pro Products

Thanks for the kind words, Joe. We think Deb Sharp is pretty special, too. We were pleased by the assistance we received from the USRA in providing data for the article and for the good show you guys put on. It's good to see that the USRA is doing well, and it's good to see that Pacer Technologies will sponsor the USRA race series again this year. LM

WANTS MORE PROPELLER INFO

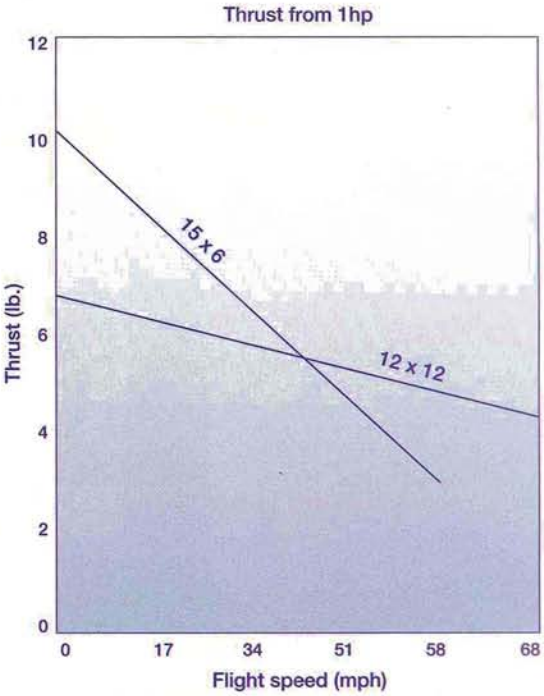
Larry, I read your "Current Thoughts" column in the March issue of *Model Airplane News* with great interest. While I'm not into electric flight too much (I have a couple of electric planes), I am very interested in propeller thrust, torque, power, efficiency, etc. I recently acquired a dynamometer with which I can measure power input to the propeller. The limitation is that the torque reading is only two digits, so accuracy/precision is only to one part in 80, or so.

I was very interested in your chart of power absorption for different size/pitch props. How did you acquire this data? How much is measured, and how much is calculated? I noticed that the power absorbed varies with the cube of rpm, which is as it should be. The most important question of all is, which brand of prop? Do you have similar data for APC props? Could this data be "transferred" to APC props by some kind of performance factor?

As you can tell, I use APC props for all my engines. Could your chart be expanded to include these high-pitch props?

I hope you can find the time to reply to my questions. I find it remarkable that your chart is the very first information I have seen on power input for a full range of props. Keep up the good work.

CALVIN MALINKA
Rialto, CA



Since you've read my columns, Calvin, you know that I'm not the sort who finds it very useful to worry about how many decimal points of precision I can get. Notice also that the tables I presented carry no numbers to the right of the decimal point, and if we increased all of those numbers by 10 percent (or decreased them by as much), I'd still feel confident that I had captured the essence of my argument in that column. While there is a sub-hobby in model aviation of measuring such things, and it's a lot of fun, all too often we beat to death the accuracy of the things we can measure and then ignore all the things we can't, even if those variables are more important to the problem being solved.

To specifically answer your questions: the numbers are all generated mathematically by a basic static thrust calculation that can be found in many places in the literature. The equation is:

$$Watts = 1.1 \times diameter^4 \times rpm^3 \times pitch$$

Note the constant 1.1. This is a prop constant that seems to work pretty well (without worrying about too many decimal points) for APC props. A prop with a wider blade and/or a more cambered airfoil would have a higher prop constant.

Used to guesstimate power requirements to set up an electric motor, these numbers work pretty well. But they won't work well at all in selecting the "best" prop to fly your airplane. The reason is that translation of static thrust numbers to flight thrust numbers is confounded by a couple of things.

Thrust decreases with flight speed,and the rate at which this occurs is related to pitch. Thrust curves for deep-pitch props, relative to thrust curves for shallow-pitched props, will often cross somewhere between zero speed and the flight speed of your aircraft. I've plotted thrust created by 1hp spinning a 15x6 and a 12x12 prop. Notice that while the 15x6 has considerably more thrust at very low speeds, once you get to 50mph, the 12x12 is the prop that produces the most thrust.

Another thing that affects translation of static thrust results to dynamic thrust is efficiency. Under static conditions, efficiency differences will be small and, if the deep-pitch prop is stalled, may even look as though it's less efficient than a low-pitch prop. But as you increase speed, props that are "square" (diameter and pitch are the same) will be more efficient than those with diameter and pitch numbers like the 15x6 I've just discussed.

So if you stick a motor/engine producing 1hp on a test stand, run a bunch of props that can absorb that horsepower on it, then measure the thrust, you'll choose the one with low pitch, as it will produce more thrust ... in a static condition. In the air, it's a different matter. Dynamometers are great tools for measuring engine performance, but unless you can put it in the aircraft and measure things at flight speeds, they aren't very good at providing "best prop" solutions. LM

Pilot PROJECTS

A LOOK AT WHAT OUR READERS ARE DOING

SEND IN YOUR SNAPSHOTS

Model Airplane News is your magazine and, as always, we encourage reader participation. In "Pilot Projects," we feature pictures from you—our readers. Both color slides and color prints are acceptable. We receive so many photographs that we are unable to return them.

All photos used in this section will be eligible for a grand prize of $500, to be awarded at the end of 1998. The winner will be chosen from all entries published, so get a photo or two, plus a brief description, and send them in!

Send those pictures to: Pilot Projects, Model Airplane News, 100 East Ridge, Ridgefield, CT 06877-4606.

AUSSIE AIRTRUCK

Quintin "Joe" Penka of Carrollton, TX, spent a year and a half building this unusual model from New Zealand Aero Products plans. The 118-inch-span, all-wood model weighs about 30 pounds and features panel lines, rivets and navigational and landing lights. The "Truck" was finished with .5-ounce fiberglass cloth and polyurethane paint. Joe says that speed was marginal with a G-38, so he plans to fly it with a G-62 soon.

ATTIC TREASURE

Fifteen-year-old Joe Caccia of New Boston, MI, found a crashed, homemade fiberglass seaplane in his grandfather's attic and rebuilt it. The 10-pound model is equipped with its original engines, two Enya .45s, and also uses its original radio, a 4-channel AM Futaba. Joe added landing gear because there isn't a pond where he flies. Nice work!

SCRATCHY AND FRIEND

Model Airplane News contributor George Wilson of Marston Mills, MA, shows off his latest creation, "Scratchy." The 3-pound, 10-ounce model uses an HB .25 for power and flies well. George, who is constantly looking for ways to improve his designs, comments, "The plan will be modified to show a longer nose moment mostly to accommodate a 6-ounce tank more easily and a narrow fuselage to minimize weight."

I WANNABE A P-63

Ian Kagihara of Corona, CA, sent this photo of his Fred Reese Cloud Dancer .60 dressed up in Bell Cobra colors. Ian powers his model with a K&B engine and writes, "It's very aerobatic and so easy to fly. Landings are slow and easy."

HAND-LAUNCH HELLCAT

This 32½-inch-span Grumman F6F-3 Hellcat started out as a Guillows rubber-powered kit, then Jimmy Wilson of Claremont, NC, modified and beefed it up to accommodate a Norvel .061 AME glow engine and 2-channel radio equipment.

ROTHMAN'S STAMPE

This ¼-scale bipe is the handiwork of Terry Overton of Oxford, MI. The model features functional rigging wires, landing gear and tailwheel; scale section cabanes and interplane struts of formed aluminum; scale control cables; Solartex iron-on fabric covering; simulated rib-stitching; and spray-painted markings. Terry writes, "... a Saito 150 improved performance dramatically but requires sensitive throttle control to give realistic flight performance."

BIG, BIGGER, BEST

Bob Buckbee of College Station, TX, enlarged Don Smith plans 60 percent and modified them slightly to come up with this 15-foot-span, 87-pound "K"-series Invader. Bob explains that the "K" was the modified version of the A-26-B that was used in Vietnam in the mid-60s. The Invader uses two Quadra 75s for power, and some of its features include: custom retracts, a bomb release on the main bay with 10 bombs and a TME smoke pump that can be set for one or both engines. Bob tells us that his big bird lands just like the full scale—fast and heavy.

DAKOTA BIPE

Brian Regan of Albuquerque, NM, sent this photo of his newest model, a Dakota biplane. He writes, "It is my second attempt at scratch-building ... I think it will fly great."

WACO YMF3

Masaki Uchida of Kawagoe, Saitama, Japan, sends greetings from across the Pacific with this photo of his ⅓-scale Pica biplane. The model has a 72-inch wingspan, weighs 16 pounds and uses an O.S. 1.08 2-stroke with a custom muffler. Masaki covered his model in 21st Century fabric, dressed it up in automotive paints and writes, "It flies elegantly and can perform old-style aerobatic maneuvers and extremely slow and easy landings."

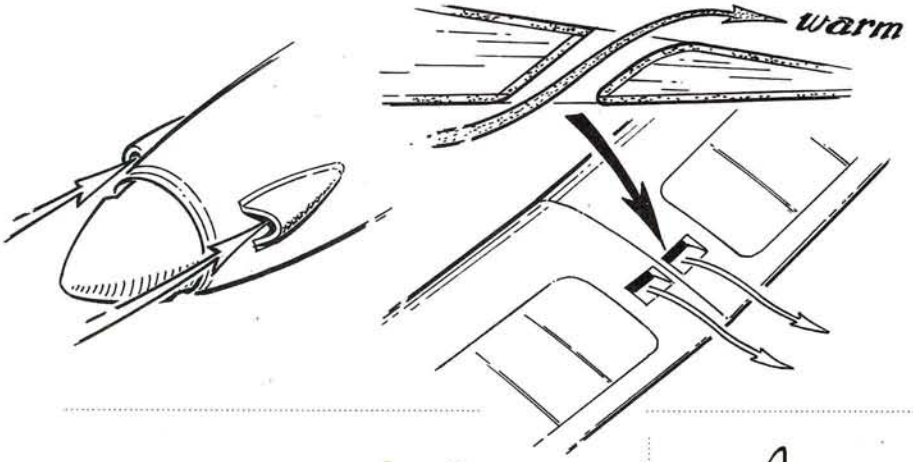
⅓-SCALE BENSON

Victor Bailey of Fredericktown, MO, built a full-scale autogyro many years ago and decided to build a smaller one this time. His model's frame is made of TV antenna tubes that have been pop-riveted together, and its rotor parts are machined polypropylene plastic and aluminum. A full battery charge results in close to 400rpm with scale plywood blades, which are kept spinning by Hitec heavy-duty servos and an ASP .65 2-stroke.

Hints & KINKS

by JIM NEWMAN

Model Airplane News *will give a free one-year subscription (or one-year renewal, if you already subscribe) for each idea used in "Hints & Kinks." Send a rough sketch to Jim Newman c/o* Model Airplane News, *100 East Ridge, Ridgefield, CT 06877-4606. BE SURE YOUR NAME AND ADDRESS ARE CLEARLY PRINTED ON EACH SKETCH, PHOTO AND NOTE YOU SUBMIT. Because of the number of ideas we receive, we can't acknowledge each one, nor can we return unused material.*



COOL INTAKES

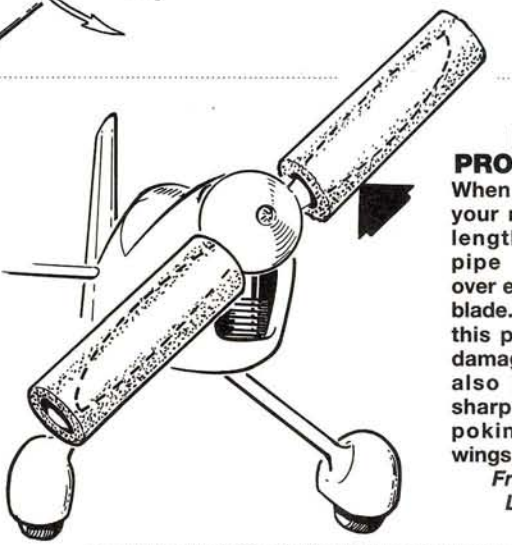
Cool your motor and battery pack by trimming Klett PEG-3 pushrod guides, then gluing them into the nose of your R/C glider as air intakes. Next, glue large-diameter aluminum tubes through the wing so that the low-pressure area will draw the hot air out, or make these simple but effective balsa letterbox slots.

Tom Fey, Arlington Heights, IL

CLEAR MASKING

Wrap clear, thin plastic sandwich wrapping around small details such as gear wires and pilots when doing paint touchups. Plastic wrap conforms much better than tape and is easier to peel off. Aluminum foil works, too.

Bill Bashore, Pleasant Hill, OH



PROP PROTECTORS

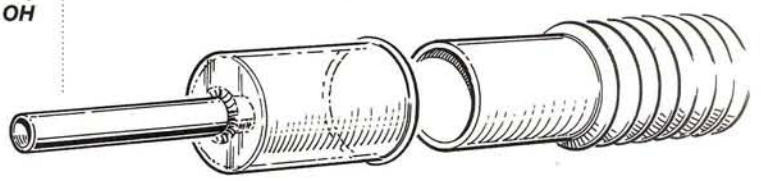
When transporting your model, slip a length of sponge pipe insulation over each propeller blade. Not only will this prevent blade damage, but it will also prevent the sharp blades from poking holes in wings, etc.

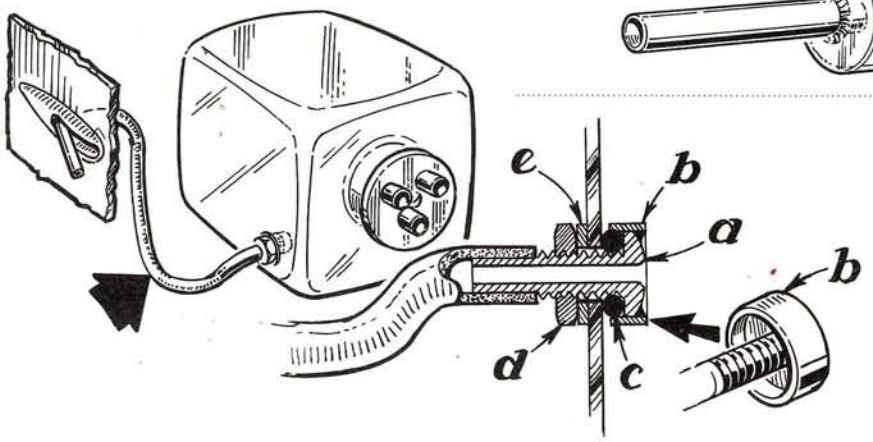
Frank Woolson, Livermore, CA

MINI VACUUM

Hot-glue a 3/8-inch (9mm) metal tube to the bottom of an old pill bottle, then plug in a regular vacuum-cleaner hose to suck sawdust out of awkward places.

Dennis Bryant, Burgess Hill, W. Sussex, England

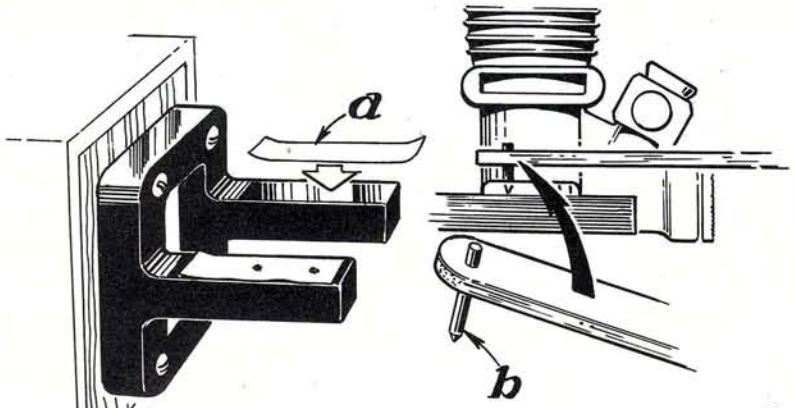




TANKS A BUNCH

To keep debris out of the carburetor line, install a separate fill line in the right forward corner of the tank. Modify an 8-32 brass screw (a) by soldering on a ring of 3/8-inch (9mm) brass tube (b), which forms a retaining cup for a 3/16-inch (5mm) O-ring (c). Also needed are a nut (d) and a washer (e). Insert the assembly through the neck of the tank using long pliers or hemostats.

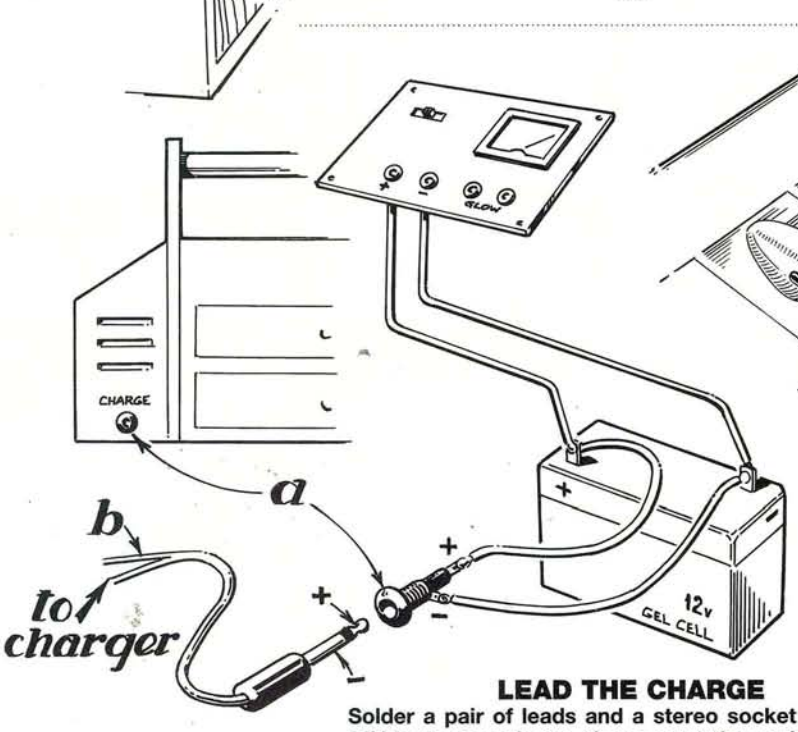
Bruce Anthony, Minnetonka, MN



VISIBLE HOLES

It's hard to see markings on black engine mounts. Stick a white paper label (a) on top of the mounts, then mark through the engine lug holes with a sharp pencil. You'll need to glue a mechanical pencil lead (b) onto a flat stick to mark under the exhaust stub.

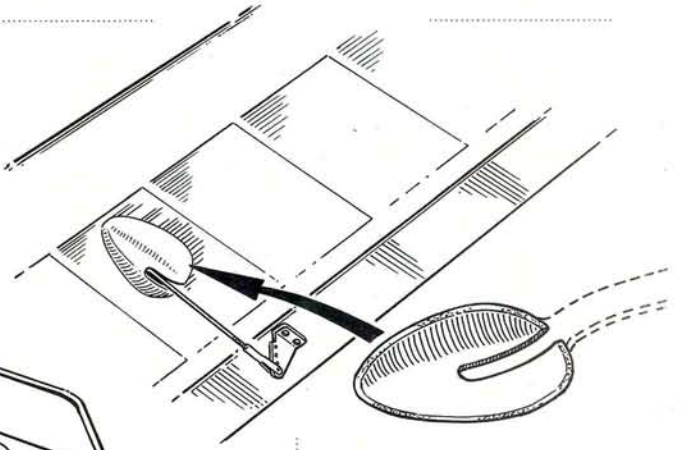
Charles Hirsch, Spring, TX



LEAD THE CHARGE

Solder a pair of leads and a stereo socket (a) to your 12V battery as shown, then mount the socket to some handy place on your flight box. Now you can just plug in your charger (b) without removing the access panel.

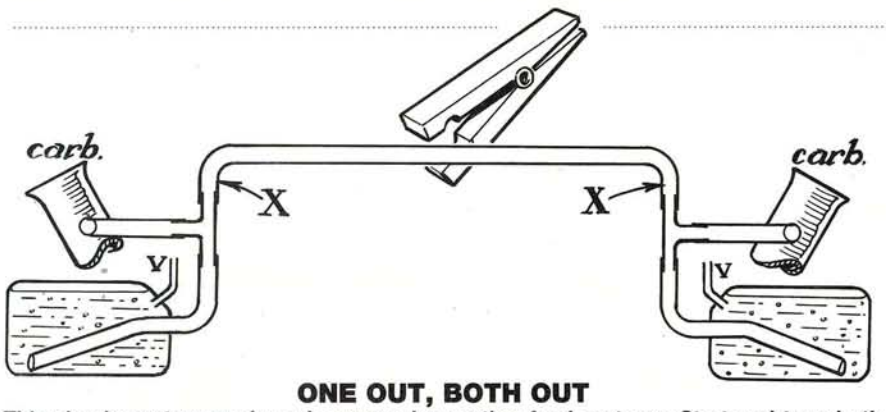
Brian Shore, Ukiah, CA



SPOONFUL

Modify a plastic spoon to be a pushrod exit cover by removing the handle then filing a slot as shown here. Glue it under the wing with a suitable canopy glue.

Ric Rector, Redding, CA



ONE OUT, BOTH OUT

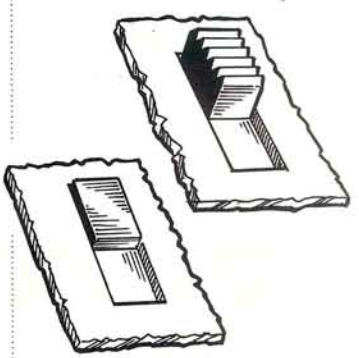
This simple system works only on regular suction-feed systems. Start and tune both engines with the balance pipe clamped off. When both engines are running to your satisfaction, remove the clamp. When one engine stops, the other will, too, because its venturi will then be open to the atmosphere and won't be able to draw fuel. Be sure each engine has a vertical tube "X" at least 1 inch (25mm) tall.

Brian Eastwood, Lavant, Hants., England

FLUSH SWITCH

To prevent the switch of your mini tach from being accidentally knocked on, slice off the switch knob. It can still be operated with finger pressure.

Eric Henderson, Moorestown, NJ



MODEL AIRPLANE NEWS

FIELD & BENCH REVIEW

AN OLD CLASSIC GE

by VIC OLIVETT

WHEN I STARTED in this hobby, my first plane was a high-wing trainer; my second was a low-wing beater; and the third, fourth, fifth and sixth were all Aeromaster kits designed by Lou Andrews. Over the years, all my Aeromasters met their demise in one way or another: a tree, a fence, another plane; and one time, the ground even jumped up 12 inches when I was coming out of a loop. When I saw that Great Planes* was coming out with a Giant Aeromaster, I jumped at the chance to review it.

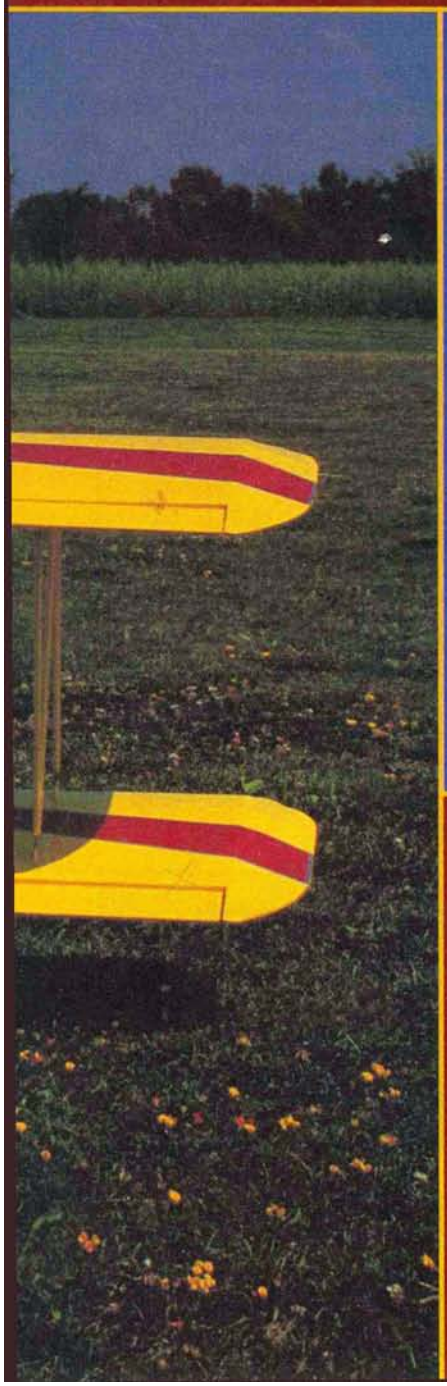
GREAT PLANES

GIANT Aeromaster

S BIGGER

THE KIT

The kit comes in a rather small box, and I wondered how it could be giant scale. Well, I understood when I picked up the box. The kit is well packed with excellent materials, including full-size rolled plans and a photo-illustrated, 50-page instruction manual. The hardware package is full of all kinds of goodies, such as two-piece landing gear made of strong, good-quality aluminum and a heavy ABS cowl and wheel pants. This is not a run-of-the-mill kit; the Aeromaster is a well-thought-out, well-designed, rugged airplane that should give the builder many years of flying enjoyment.



SPECIFICATIONS

Model: Giant Aeromaster

Manufacturer: Great Planes Model Mfg.

Wingspan: 73.5 in. (IMAA-legal)

Type: sport biplane

Weight: 17 to 19 lb. (17.25 lb. as flown)

No of channels req'd: 4 (aileron, rudder, elevator and throttle)

Engine req'd: 30 to 60cc

Engine used: U.S. Engines 41cc

List price: $379.99

Features: full-size rolled plans and a photo-illustrated, 50-page instruction manual; interlocking, die-cut, lite-ply and balsa construction; two-piece formed-aluminum landing gear; ABS cowl and wheel pants; pre-formed aluminum cabane struts; complete hardware package.

Hits

- Superb instruction manual and plans.
- Excellent-quality lite-ply, balsa and hardware.
- Easy construction.
- Very stable and easy to fly.

Misses

- None.

TAIL SURFACES

The tail is large and strong. I usually like to add flying wires to support the stab, but the construction of the Aeromaster's tail is so well done that flying wires would be just for looks. The stab is built up using 3/8- and 1/2-inch stock. The trailing edge is doubled for support and to increase the gluing surface area for the hinges. The structure is cross-braced and then sheeted with 1/16-inch balsa. The elevators are built up, cross-braced and left open. The vertical fin is built up and then sheeted, as is the stab. The rudder follows the same construction as the elevators. Medium Zap* works well on the entire structure.

One of the expert tips in the manual shows a simple way to mark and install the hinges. Be careful when cutting the slots for them, as the balsa used for the trailing edge is dense and hard (this adds to the strength of the stab). After the tail has been sanded (do not glue the hinges at this time), you can set it aside.

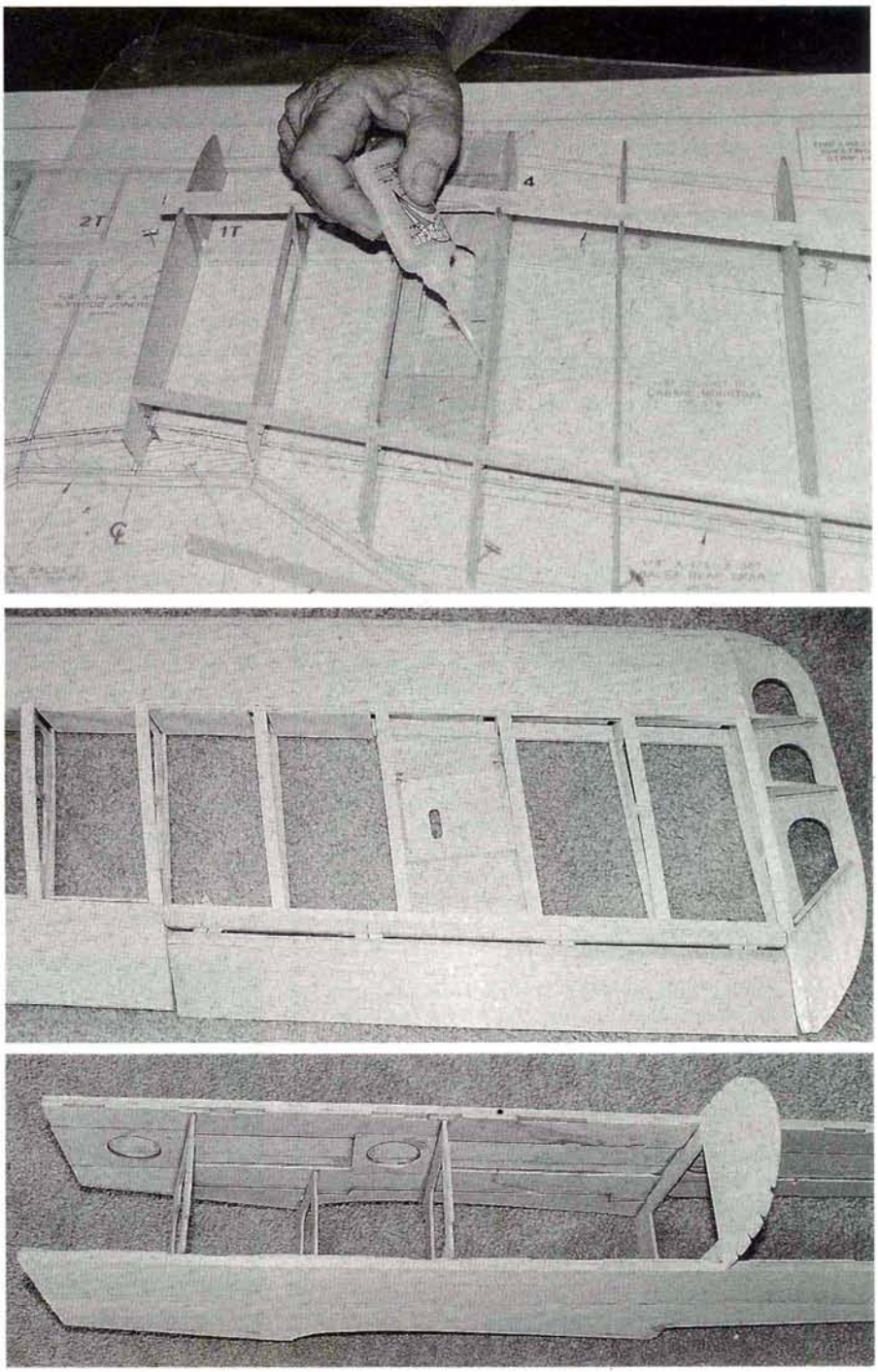
WINGS

Wing construction begins with some pre-assembly, including the four ribs that will be used for the strut tabs and the actual strut tabs. I used medium Zap on the ply rib doublers and the strut tabs. The strut tabs are made up of 16 die-cut plywood parts with the grain running in opposite directions on the two sets of eight. I used medium Zap to laminate, and then I wicked in some thin Zap at the punch marks before drilling the 1/16-inch holes for the struts.

There are several different types of wing ribs. Be very careful when gluing the ribs for the struts. Remember the strut tabs face downward on the top wing and upward on the bottom wing. The wings are built directly over the plans. I found that the backing from a roll of MonoKote* will protect the plans much better than wax paper. Zap or another CA will not penetrate the plastic backing.

With the spars and ribs pinned down properly, you will construct a very straight, strong wing. I found that all the parts for the wing fit extremely well. The spars are webbed front and back with 3/32 balsa. The ailerons are built as part of the wing and then cut out later. This helps produce a straight wing.

Now is a good time to decide whether you want to use two or four servos in the wings. I decided to go with four because I find that slave struts just aren't worth the trouble. The instruction manual shows how to install the servos on removable plates that are then screwed into place. I first used this system in a Top Flite P-47, and it worked out very well. The ribs have large cutouts through which the servo wires are pulled (using optional newspaper tubes or pull lines) during radio installation.



Top: the center section of the top wing showing the attachment plate for the cabane struts. Center: to ensure a straight wing, the ailerons are first built as part of the wing and then cut out and hinged later. Bottom: the fuselage sides are easy to construct; they're made using 1/8-inch lite-ply and reinforced with 1/4-inch balsa sheeting.

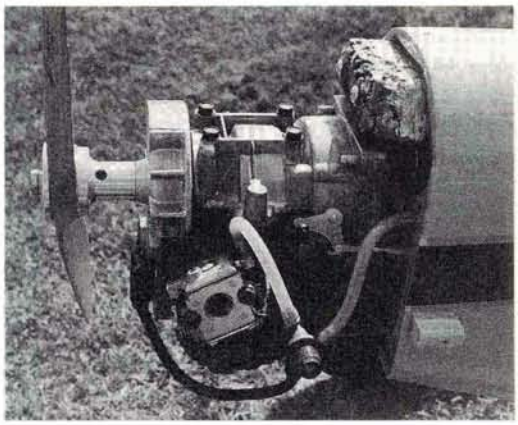
To provide some working time, I used thick Zap to sheet the wings. I found that all the sheeting in the kit was excellent. After the sheeting has been completed and sanded, the wing halves can be joined. The wing joiners and bolt plate will more than support this center section. The top wing is built in the same manner. There are a few more steps to building the top wing, due to its sweep and the mounting plates for the cabane struts. The ailerons can then be cut out to install the leading and trailing edges. They are shaped and sanded. Do not glue the hinges at this time.

THE FUSELAGE

The first step in the construction of the fuselage is very important. This is the installation of the 1/4-inch ply cabane dou-

blers that are Z-poxied to the 1/8-inch ply top deck. The top side of the top deck has punch marks to ensure the proper alignment of the holes for the cabane struts. The strut bolts are anchored with 6-32 blind nuts, and a little medium Zap around each will hold them in place.

The Aeromaster was designed to use the U.S. Engines* 41cc engine. The instructions and plans show the proper installation of the engine. I also used the J'tec* isolated engine mounts. The plywood space plates are provided in the kit if needed for other engines. All this makes for a very neat, clean and simple installation.

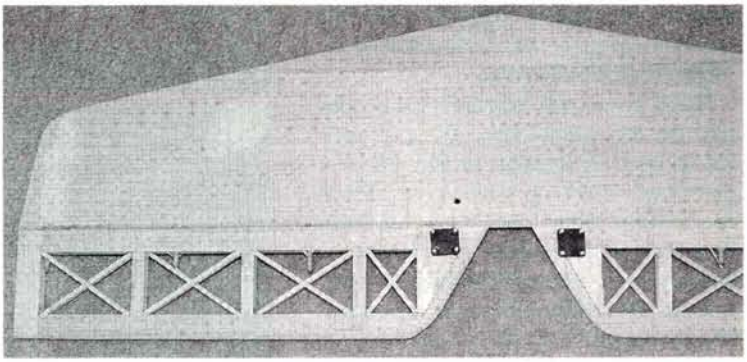


The U.S. Engines 41cc ran perfectly out of the box and is a great match for the Giant Aeromaster.

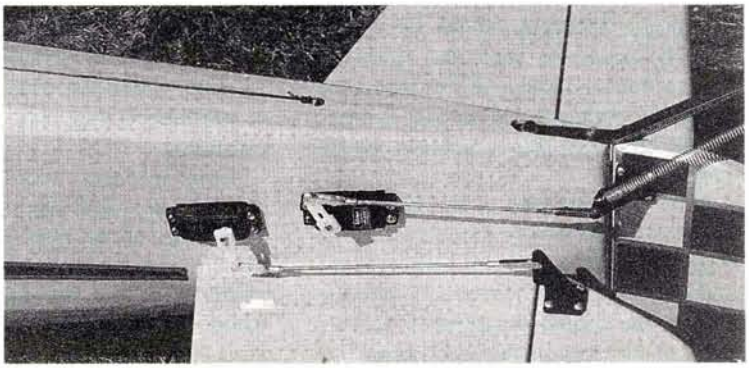
The fuselage sides are designed for the servos to be installed in the tail or inside the fuse. This is accomplished by die-cutting the rear knockouts. If you are not going to install the servos in the tail, a few drops of thin Zap will keep the knockout permanently in place. The rest of the fuselage sides are constructed using 1/8-inch lite-ply reinforced with 1/4-inch balsa sheeting. This system will give you a very strong, straight fuselage. The rest of the fuselage is straightforward and easily constructed and is simplified by its interlocking construction.

ASSEMBLY AND ALIGNMENT

The final assembly of the fuselage, tail and wings is very important to ensure a good flying biplane. The bottom wing is installed first using four 1/4-20 bolts. This procedure is critical because this will be the reference point for the top wing and the tail, so take the extra time needed to get it right. After completing the final alignment and assembly, I sanded the entire airplane and prepared for finishing.



The stabilizer is built up and then sheeted. The elevators use the same construction as the rudder.



I decided to install the tail-control servos in the tail. I used one Hitec HS-300 servo on each aileron and one on each elevator with 4-40 hardware on all the control surfaces.

FLIGHT PERFORMANCE

When I took the Giant Aeromaster to the field, it was like going back in time; this airplane brings back so many memories. I choked the engine, set the throttle at 1/4, turned back the spring starter and, to my surprise, the engine started the first time. As I pulled the stick back, the engine had a perfect idle. Transition to top end was excellent. The engine ran perfectly right out of the box.

After a few taxi and high-speed runs, I brought the Aeromaster back to the pits for one final check.

• Takeoff and landing

Back out on the runway and into the wind, I was finally ready to go. Once the power was applied, the Aeromaster became very responsive. The tail came up, and it was off the ground with authority. The Aeromaster was as gentle as an advanced trainer and had a very smooth, clean climb-out. On the downwind leg, one click of up, and the Aeromaster was trimmed out perfectly. Turn to base and then final, and it was just a matter of keeping the wings level to a very nice 3-point touchdown. Then the surprise: during rollout, I neutralized the stick, and the Aeromaster wanted to lift off again. I found that this plane would fly at very slow speeds.

• High-speed performance

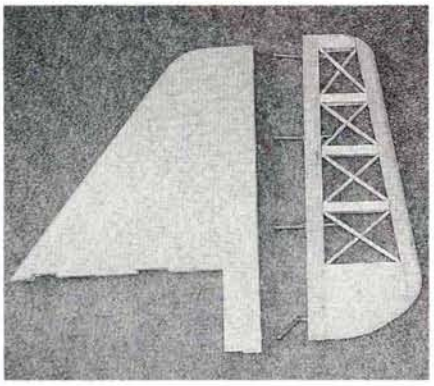
The Aeromaster cruises very nicely at a touch more than 1/2 throttle, and when full power is applied, the Aeromaster is ready for anything. It is very stable and responsive. This airplane settles into the groove and stays where you want it.

• Low-speed performance

Remember, I said that the Aeromaster would fly at very slow speeds. I had a great time just chugging around. The controls are still very effective even when the plane is flying at barely more than stall speed. The stalls are very clean and straightforward. Once the power is pulled back, just keep adding up-elevator and the nose will drop. You will be surprised how slowly the Giant Aeromaster will fly before it stalls. Recovery is accomplished by just adding power and it will resume level flight.

• Aerobatics

The Giant Aeromaster makes you feel like a barnstorming pilot. It just wants to play and have a good time. Loops, rolls, split-S's and stall turns are not a problem for the Aeromaster. This plane has many of the characteristics of a full-size aircraft. Keep the speed up, and your maneuvers are clean and impressive.



The stabilizer is built up, cross-braced and then sheeted with 1/16-inch balsa. The rudder is built-up, cross-braced and left open.

The wing struts are made of six pieces of airfoil stock that are drilled and tapped for 4-40 threaded rods and 4-40 clevises. One end of each strut has a 4-40 nut to lock the clevis in place and make it easy to adjust the wings. To help assembly at the field, I numbered the struts L1, -2, -3 and Rl, -2, -3. The engine cowl and wheel pants are ABS plastic and have interlocking glue joints. That they interlock helps to strengthen the glue joints. For ABS plastic, the wheel pants are very strong.

A template for the cylinder head allows easy cowl installation. Although the Aeromaster's nose is rather small, the U.S. 41 fits in the cowl nicely. The instruction manual also shows you the proper wiring for the on/off ignition switch.

FINISHING

I finished the Giant Aeromaster with yellow MonoKote and burgundy trim. I like yellow because it's easy to see on sunny and cloudy days.

I then installed the Hitec* HS-300 servos. The 300s have more than enough power to handle the control surfaces. I used four in the wings, one on each aileron and one on each elevator. I used 4-40 hardware on all the control surfaces. Powered by a 1700mAh battery pack, the always reliable Hitec Prism 7 was used for guidance.

CONCLUSION

The Great Planes Giant Aeromaster will bring back memories for old-timers and will be a very enjoyable project for modelers who are thinking about their first giant-scale gas-engine project. Great Planes has done an excellent job on the design, instruction and quality of this kit. If you have any time on an advanced trainer, you will be able to fly the Giant Aeromaster very confidently.

**Addresses are listed alphabetically in the Index of Manufacturers on page 118.*

MODEL AIRPLANE NEWS

FIELD & BENCH REVIEW

Less time building, ***more time flying***

Model Tech J-3 PIPER CUB ARF

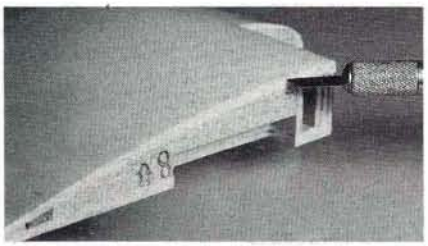
OLD-TIMERS TEND to give short shrift to ARF kits! Well, I'm an old-timer who grew up with Comet and Ambroid glue, as well as bamboo paper and nitrate dope. None of us OT'ers were sorry to see silkspan as an inexpensive replacement for high-priced silk, nor were we slow to switch to pylon models when they started to win contests. When the glow plug came along, the switch was almost instantaneous! I guess we were younger and our opinions were more flexible. Well, this old-timer is here to tell you that ARF kits are

by RANDY RANDOLPH

The Model Tech J-3 Cub ready to fly.

good things, not only for the new inductee to modeling but also for the old hands who have found that the press of other activities leaves them less time to spend in the shop. And don't tell me you can't learn anything about modeling by building them!

Now, about the Model Tech* J-3 Piper Cub (exclusively distributed by Global Hobby Dist.*): although it may not be the scale purist's idea of the perfect J-3, this kit is a nice package! Everything is



The wings are joined by a hefty plywood joiner that fits perfectly. It's a good idea to trim the covering overlap around the edges of the center ribs to secure a good wood-to-wood glue joint in this area.

wrapped separately and arranged to protect each major—and minor—part. The instruction manual gives a complete inventory of the kit contents, and the hardware package is complete down to the last bolt and nut. Other than engine and radio systems, the builder will need CA and epoxy glues, a hand or electric drill with assorted drill bits, a modeling knife, a straight-edge ruler, a Dremel tool with assorted bits, a Phillips screwdriver, pliers, a builder's square, 220-grit sandpaper, masking tape, RC 56 canopy glue, paper towels and scissors to complete the project.

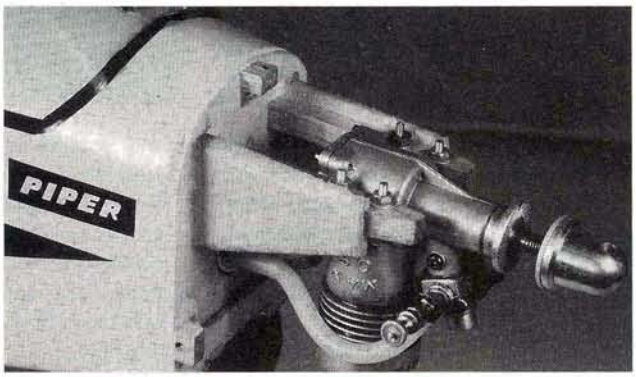
Since the airplane is covered with Ultracote, the first thing I did was to look over all the pieces and iron out any wrinkles that may have developed since it was packed. There were a few, and most were easily removed with the iron set on medium heat. It's a good idea to check all edges and iron down any small flaps that might have been missed during covering.

As usual, I followed each step in the manual and checked the box provided when the step was complete. The first assembly step is to join the wing halves with the wing joiner/dihedral brace. At the trial fitting, I expected to have to do a little sanding and trimming to secure a good fit of the halves, but only light sanding of the ply brace was necessary. I trimmed away most of the covering overlap at the center of both wing halves before joining them, so I would get a good wood-to-wood joint when the epoxy was applied. This seemed like a good time to epoxy the aileron hinges into the wing, so I did.

Once the wings had been joined and the glue had cured, I was truly surprised that the predrilled holes in the leading edge of the wing were a perfect fit for the two pre-installed dowels that hold the leading edge of the wing to its mount!

The trailing edge of the wing is anchored to the fuselage with a 4mm bolt. The only deviation I made from the instructions in this area was to sand two half moons into the aft wing mount in the fuselage to give a little more clearance for the aileron horns. Again, everything fit as it should.

Installing the aileron servo in the wing as described was smooth, but there was a serious hitch in the linkage between the servo and the aileron horns. The kit provides two pieces of wire with Z-bends in the ends (they're actually more like S-bends!) and instructs you to use the Z-bends in the plastic horn brackets threaded on the ends of the aileron torque rods. To work properly, these must be perfect Z-bends; otherwise, movement of the arms will cause the horn brackets to turn and disengage from the Z-bends. Naturally, that would mean total loss of aileron control! I could have rebent the wires to look like Z-bends, but it's better still to use solder or threaded clevises on the ends of the pushrods, as I did. From that point on, completing the wing was "by the book."



Very good hardwood mounts are already built into the firewall and fuelproofed. This is a nice touch. Wooden mounts tend to absorb vibration and make for a quieter-running engine.

The stab was glued into position on its mount and fit very well; a slight amount of sanding allowed it to be as perfectly horizontal as it should be. The fin was glued into its mount on the top of the stab and it, too, lined up just right. Before installing the elevator and rudder, I mounted the control horns. This was out of sequence with the instruction manual, but the job is so much easier when the surfaces are in hand rather than on the airplane!

Installing the tailwheel and rudder was really no problem. The heavy-duty, metal tailwheel mounting bracket is attached to the fuselage with three wood screws. The instructions say to mount the bracket and bend the tiller arm at a right angle after it has been inserted into the mount. It is much easier to put the axle through the bracket and make the bend before screwing the mount to the fuselage. The only trick is to capture the tiller arm when hinging the rudder to the fin and fuselage.

Since I had a can of Cub Yellow spray paint, it seemed like a good idea to paint the aluminum landing gear before it was

SPECIFICATIONS

Model: J-3 Piper Cub

Type: sport-scale

Manufacturer: Model Tech

Wingspan: 48 in.

Wing area: 360 sq. in.

Wing loading: 20 oz./sq. ft.

Length: 31 in.

Weight: 3.2 lb.

Engine req'd: .20 to .28

Engine used: O.S. .25 2-stroke

Channels req'd: 4

List price: $99.99

Features: fuselage, wings and tail are completely finished and covered with Cub Yellow Ultracote. A well-engineered and fuelproofed wooden engine mount is built into the fuselage, and the windshield and windows are preformed and fit well. The painted fiberglass cowl, landing gear, fuel tank, wheels and tailwheel assembly are all included, and the hardware package is complete; it even includes extra screws for the cowl and a spinner prop nut.

Comments: this is an ARF, but there is enough assembly required to give the first-time builder some valuable experience without pushing him beyond his limit. It was a relaxing project and is a solid airplane to fly.

Hits

- Very good workmanship.
- Smooth covering job with high-quality film.
- Very good parts fit.
- Step-by-step instruction manual.
- Excellent hardware.

Misses

- Use of poor Z-bends in pushrod connection to aileron horns. To be safe, should be replaced with clevises.
- Fuel tank somewhat difficult to install.

PHOTOS BY RANDY RANDOLPH

FLIGHT PERFORMANCE

Balancing the J-3 at 25 percent aft of the leading edge of the wing—the suggested place—took about 1/4 ounce of solder wrapped around the tailwheel spring. Adding weight to the tail of a scale-type airplane is unusual! Anyway, with control throws in the "training" range, the airplane was a pleasure to fly.

• Takeoff and landing

With a little forward stick, it tracks down the runway like an arrow and requires only a slight bit of right rudder at the start of the takeoff run. When the tail comes up, it's ready to fly. The old O.S. .25 provided plenty of power for a brisk climb-out. Control response is solid and smooth, which makes for a rather graceful airplane.

I like 3-point landings, but this airplane doesn't! Wheel landings are its thing, and if you do your part, they will look so good you might want to go around and do it again, just for fun! Stalls are straight ahead, and recovery with power is fairly quick.

• Aerobatics

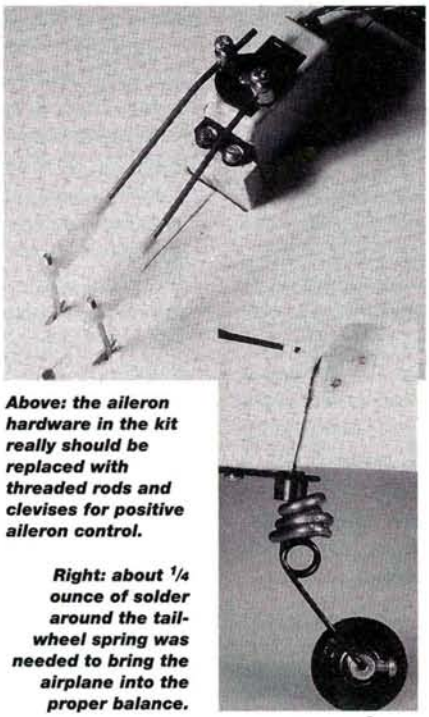
I almost put a question mark after this category! But if you consider loops, lazy rolls, snap rolls, wingovers and stall turns to be aerobatics, then the category applies. Increase the throws on all control surfaces and move the balance point aft about 1/4 inch, and all of the above are possible; not Cub-like, but possible, and not too bad-looking, at that!

attached to the fuselage. With a couple of coats, it blended into the fuselage very well. The method of mounting the wheels will require a Dremel tool with a cutoff wheel or a hacksaw and elbow grease. The axles have a long, threaded area that must be transverse with a locknut, then cut off outside the nut. An electric screwdriver is handy, too!

A plywood mount is provided for the rudder, elevator and throttle servos, and it needs to be drilled to match them. I used some old Ace* servos, and they fit the cutouts perfectly. Radio installation is straightforward, after the pushrods to the rudder and elevator have been assembled. I used my standard stainless-steel safety wire (through a sheath made of the insulation of no. 12 copper wire) for the throttle line, mainly because I have been doing it that way for so long. The wire provided in the kit was somewhat larger and would have done the job just as well.

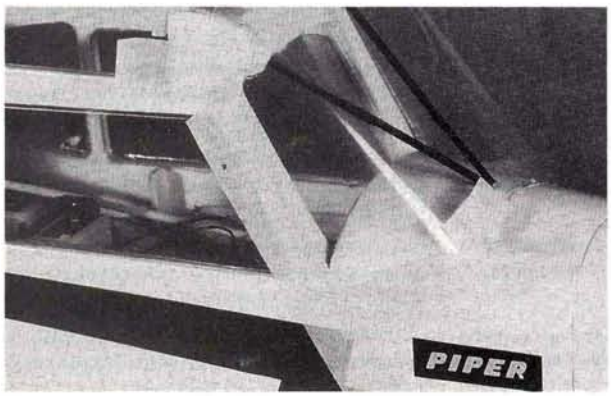
The fuel-tank installation had one small hitch: I had to trim the stab former at the landing gear to get the tank to slide into its proper place and through the firewall. This tank mount is a neat arrangement and would have been simple if not for that former. To drill the engine-mounting holes in the wooden mounts, I placed the inverted engine on top of the mounts and used it as a drill guide. When the engine was mounted on the bottom of the mounts, as it was supposed to be, the holes lined up perfectly.

The cowl fit very well and was easy to trim for glow plug and needle valve access using a Dremel tool with the large burr and cleaning up with sandpaper wrapped around a dowel. The muffler cutout took a little more effort, but the finished job was pretty darned good. The painted fiberglass cowl is easy to work with and is strong enough to last a long time.



Above: the aileron hardware in the kit really should be replaced with threaded rods and clevises for positive aileron control.

Right: about 1/4 ounce of solder around the tailwheel spring was needed to bring the airplane into the proper balance.



Masking tape holds the windshield in place while the glue cures. The V-shaped braces were added just behind the windshield because all Cubs had them. (You would have a hard time getting out of the front seat without 'em!)

Before we go any further, I want it understood that I dislike installing windows and windshields, although in this case, I almost enjoyed part of that operation! The side windows are formed on a single piece of plastic and, once cut out, are slipped into place from the inside of the fuselage with little effort. Only the rear windows needed a little urging. I taped the windshield in place with masking tape, marked the areas that needed to be trimmed with a felt-tip pen and trimmed it to the marks. It fit the first time, and I glued it in place with RC-56 as recommended. The kit provided plenty of black tape to outline all the windows; however, since the picture on the box only showed the tape around the windshield, that's what I did!

The elevator and rudder pushrods must be built up from wire and wooden dowels. This is easy as long as you have a 5/64-inch bit to drill the anchor holes in the ends of the dowels to receive the wire ends, which are then bound with thread and epoxied. The hardest part of the pushrod installation was finding the exit cutouts in the aft fuselage sides! There is plenty of room inside this airplane, and installation of the radio system presented no difficulty at all.

All of the predrilled holes for the strut mounting screws fit perfectly. The holes in the strut mounts are slightly elongated to allow slight adjustment if necessary, though very little was needed. The struts really improve the looks of the finished model, but the airplane flies somewhat better without them and they do take a little longer to set up at the field. The choice is yours.

**Addresses are listed alphabetically in the Index of Manufacturers on page 118.*

21st Annual QSAA Fly In

Main image: Jim Collin built this Curtiss Falcon A-3 from Technical Research plans and displays it here with a 1/4-scale weapons delivery cart and mechanic. Insets (left to right): Dean Lassek's own-design A-10; Bob Olsen's own-design Polish PZL P.8/II; Noel Johnston modified this Republic P-47C from a Nosen kit; closeup of Jim Collin's Curtiss Falcon gunner.

BIG wins in Las Vegas!

by JERRY NELSON

THE QUARTER SCALE ASSOCIATION OF AMERICA (QSAA) holds its annual fly in each October in its headquarters city of Las Vegas, NV. Last year, the 21st QSAA was held on October 16 to 18. The QSAA group and president Warren Cross really do a first-class (Las Vegas-style!) job of organizing and running the event. It seemed that everywhere you looked, there was a QSAA member directing, organizing, or running something.

On the first day, a show-and-tell/manufacturers trade show was held at the Sam's Town Casino; actually, the exhibit area was in the first level of the huge parking garage. Although the setup sounds unconventional, it worked out perfectly. The open sides of the garage allowed a gentle breeze to flow through the area, exhibitors parked right next to their display areas, and modelers unloaded their aircraft for static display very close to the display area.

PHOTOS BY JERRY NELSON

21st Annual QSAA Fly In

Most of the 30 or so exhibitors offered products intended for scale and giant-scale applications. There was a good crowd of modelers in attendance, and the exhibitors seemed pleased with their sales efforts. Several long rows of tables held 50 or so static-display models and offered ideal conditions to look closely at the models.

Friday and Saturday, under perfect flying conditions, were flying days at a dry lake bed about 10 miles from town on the way to Boulder Dam. The dry lake bed is very smooth and several miles long. Next to the flightline and pit area were the numerous vendor display areas. There were some additional vendors there who had not been present at the Thursday indoor activity. To the rear of the vendors were rows and rows of cars and motor homes and a few light aircraft that had been flown in.

Several efficiently run flightlines were in operation, and participants could have flown four or five times a day, perhaps even more, if they had wanted to.

At noon, demonstration flights were made by unique aircraft and vendor demonstration aircraft. Not only could you look at the products on display, but you could also see whether the stuff worked.

Clockwise from top left: Jerry Kitchen's Meister Scale Corsair uses a Sachs 4.2 for power; Larry Jervis poses with his RacePro GR-7; Quintin Penka's Cessna 140; Noel Hess's own-design WACO VKS7 uses a modified Saito 5-cylinder engine for power; Claude McCullough built this WACO AVN-8 using original factory drawings for the full-size plane; Sid Tanabe's own-design Kit Fox is covered with Stitts fabric and paint; Bob Walker, owner of Robart Mfg., takes a break from his business to pose with his scratch-built Stearman PT-17 from reduced Sid Morgan plans; Bill Hunt built this Travel Air Mystery Ship from Fred Reese plans; Dave Lane finished building this Christen Eagle II from a Fred Noll kit after his friend and fellow modeler Ray Hoffman passed away; Russ Trubia's own-design Ryan STA; Andreas Geitz came from Germany to fly his Gee Bee R2 at QSAA; Dale Yaney's own-design Northrop RB-35 flying wing; Bob Olsen's electric-powered Polish PZL P.8/II.

Jorg Vogelsang of Hagen, Germany, has attended QSAA fly ins for many years with his magnificent aircraft. All of his projects are ultimate examples of model engineering. Jorg designed and spent eight months building this 27-percent-scale Messerschmitt 328.

BEST OF SHOW

The model has a 70-inch wingspan, weighs 45 pounds and uses two AMT turbines for power. The original aircraft was built in late WW II as a test aircraft for pulse jets and turbines. It was intended to be a low-cost attack fighter, but only 12 were built.

The model's fuselage is constructed of fiberglass, and its wing is built from carbon fiber. An aluminum spar is used. A retractable, shock-absorbing, air-operated landing skid is used for landing; and a droppable, two-wheel dolly is used for takeoff. A releasable tailhook holds the aircraft in takeoff position while a bungee cord is stretched to catapult the aircraft. A split-rudder speed-brake feature is deployed to increase drag for landing.

The entire nose is easily removed to provide access to the radio equipment and, more important, to allow the starting of the two turbine engines.

The aircraft was flown twice during the noontime flying demonstration periods. The engines started quickly, and when the tailhook was released, the aircraft accelerated quickly and tracked perfectly straight ahead. At about 5 feet of altitude, the dolly was released, and immediately afterward, the bungee cord was disconnected from the nose-hook attachment. Climb rate was exceptional. It was obvious that there was a lot of power available. The noise level with both turbines going flat out was very low.

The aircraft appeared to be flying at around 200+mph and is fully aerobatic. Rolls, loops, knife-edge flight, Cuban-8s and several low, high-speed passes were easily accomplished.

The landing was uneventful. The engines were either throttled back to idle or shut off (I couldn't tell because of the low noise level). The twin landing skis were deployed, and the aircraft glided in to a smooth (somewhat fast) landing right in front of the spectators. Obviously, everyone was watching Jorg's flight. When the aircraft stopped after the landing, everyone gave Jorg a long, well-deserved round of applause.

An interesting note: when Jorg went to the Las Vegas airport with a container to buy some jet fuel, the operator there wouldn't sell him the fuel unless he put it directly into an aircraft; the regulations didn't allow for model aircraft. After much discussion, an agreement was made so Jorg could buy 5 gallons of jet fuel.

21st Annual QSAA Fly In

Jorg Vogelsang, from Germany, flew his twin-turbine-powered Messerschmitt 328. Words cannot describe the thrill of seeing this magnificent example of world-class modeling. Andreas Geitz, also from Germany, demonstrated his huge Gee Bee R-2 powered with a Seidel 9-cylinder radial. Andreas proved that the Gee Bee can be flown flight after flight with complete control of the aircraft in all attitudes. The Gee Bee's landings were uneventful, and Andreas was able to taxi back to the pit area each time.

Many other interesting demos were made, including an excellent show by Dave Patrick flying his giant Tournament of Champions aircraft.

A formal banquet was held on the last evening at Sam's Town Casino. After dinner, recognition was given to the various people involved in running the fly in, and then the awards were given out.

The QSAA started an award system that has proven to be an excellent method of recognizing modeling efforts. The participants vote for their choice of the "best of" the various events. The results of the ballot are announced as winners.

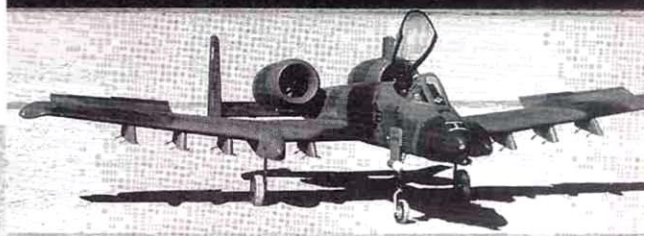
The last portion of the evening was a presentation by an Air Force officer on the unmanned Predator surveillance aircraft. This is perhaps the Air Force's first pilotless combat aircraft, and it isn't a simple PRV R/C model-type aircraft: it's big and has a 200hp Rotax engine. An overview of its amazing capabilities was given.

If you haven't been to the QSAA Fly In, by all means attend the next one. It will be held on October 15 to 17, 1998, in Las Vegas. Bring your ¼-scale aircraft and participate in the fun.

Top left: Randy Hansen's cropduster fleet of two Transavig Airtrucks and a Cessna Agwagon (all are built from New Zealand Aero Products plans imported by Northwest AG Aircraft, Rt. 4, Box 575-28, Astoria, OR 97103). Top right: Ken Safer's own-design Bristol Beaufighter. Middle: Dan Molinsky's P-61 Black Widow built from Ziroli plans. Below: Noel Johnston's Republic P-47C built from a Bud Nosen kit. Right: Dean Lassek's own-design A-10 Warthog. Below right: Nick Rivaldo's own-design Fairchild C-199G Flying Boxcar.

1997 QSAA AWARD WINNERS

BEST OF SCALE	sponsored by Ed Morgan Memorial	**Noel Hess** WACO VKS-7F
BEST OF MILITARY	sponsored by George Killeen	**Noel Johnston** Republic P47C
BEST OF STAND-OFF SCALE	sponsored by *Model Airplane News*	**Dave Lane** Christen Eagle
POWDER PUFF	sponsored by Anheuser-Busch	**Connie Vaughn** Rearwin Speedster
JUNIOR ACHIEVEMENT (under 18)	sponsored by Howard Hughes	**Marc West** YAK-55B
BEST SCRATCH-BUILT	sponsored by Billy Root	**Ken Safer** Bristol Beaufighter
BEST OF STATIC	sponsored by Sig Mfg.	**Ed Hess** Northrop XP-79B
BEST CIVILIAN AIRCRAFT	sponsored by John and Donna Lacomb	**Claude McCullough** WACO AVN-8
BEST OF ELECTRIC	sponsored by AstroFlight	**Addie Naccarato** Farman
BEST HOMEBUILT	sponsored by Ted Nelson Co.	**Sid Tanabe/Nelson Aircraft** Kit Fox Biplane
BEST OF MADERA	sponsored by Madera Giant Scale Racers	Tie: **Larry Jervis**—GR-7 and **Dave Smethe**—AT-6
BEST OF JET	sponsored by Circus Circus Hotel and Casino	**Dean Lassek** A-10 Warthog
BEST FINISH	sponsored by K&B Mfg.	**Bill and Barbara Hunt** Travel Air
BEST MECHANICAL ACHIEVEMENT	sponsored by Vance Decals	**Dale Yaney** Northrop RB-35
BEST OF SHOW	sponsored by *RC Modeler* magazine	**Jorg Vogelsang** ME 328
BEST SCALE FINISH	sponsored by FM Products	**Sid Tanabe** Kit Fox Biplane
BEST BIPE AFTER 1918	sponsored by Coverite	**Jim Collin** Curtiss Falcon
BEST CRASH	sponsored by Jorg Vogelsang	**Bobby Wilson/Cactus Aviation** Bearcat



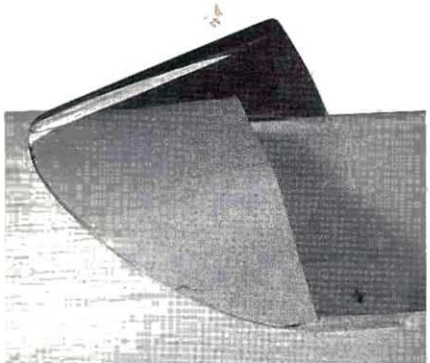
MODEL AIRPLANE NEWS
HOW TO

Build an Operational Canopy

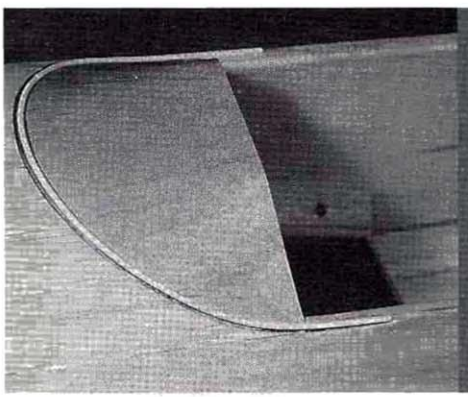
by FAYE STILLEY

Good looks, easy access in 16 steps

Operational canopies are rarely seen except on designer scale models, probably because they are not shown on the plans for sport-scale and sport models. They really dress up a model and are easy to make, so why not put one on your next project? A canopy also provides greater access to the interior of the model.

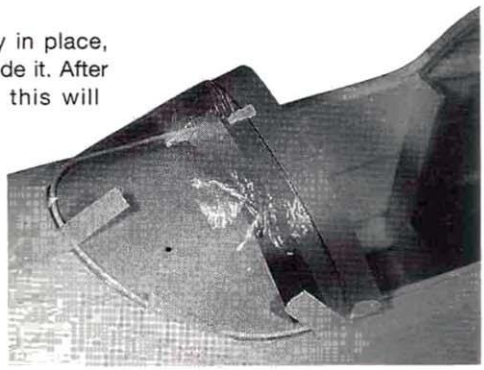


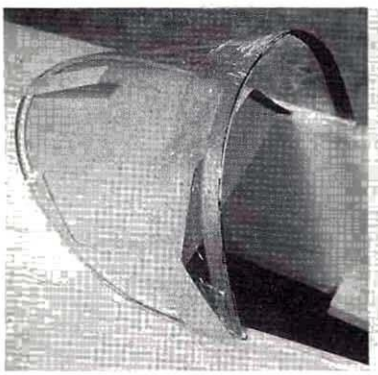
1 The fuselage opening and Plexiglas canopy are trimmed to fit each other. Unlike a fixed canopy installation in which the Plexiglas is cut oversize, the Plexiglas is cut to fit into the fuselage opening, then the windshield portion is cut away at the separation line. The windshield will be the fixed part of the finished canopy.



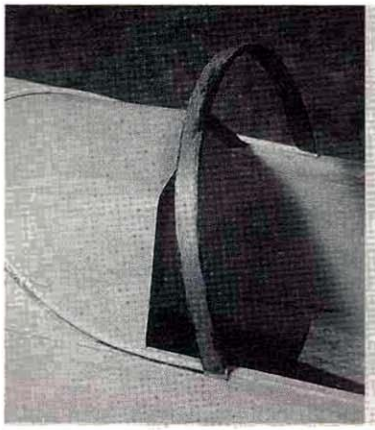
2 I used small-diameter plastic tubing to add a small frame inside the opening and around the base of the windshield. (Bamboo would also work well because of its rounded shape.) This frame will serve as a supportive glue surface for the Plexiglas and as a neat trim piece for the inside of the windshield. Be sure to provide enough space between the trim and the fuselage opening for the Plexiglas.

3 With the windshield taped securely in place, press a piece of heavy paper up inside it. After you've drawn reference lines on it, this will become the pattern for the windshield frame pieces. Note how the paper follows the forward slant of the Plexiglas. Making the pattern this way ensures that the plywood pieces will be curved correctly and at the right angle to be attached to the fuselage.



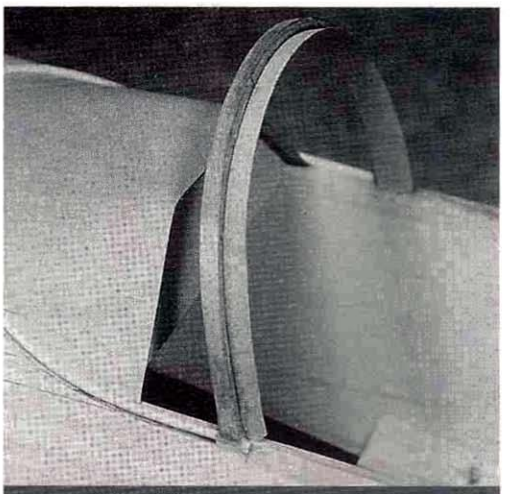


4 The first piece of 1/64-inch-thick plywood has been glued in place. Thin plywood is used to accurately capture the exact curvature of the Plexiglas without distorting it. Protect the Plexiglas with plastic food wrap, and ensure that the plywood is pressed firmly against the inside of the windshield before you glue it to the fuselage at its ends. Use odorless CA to avoid fogging the Plexiglas. Note that the first piece of plywood has been fastened to the outboard side of the trim strip.

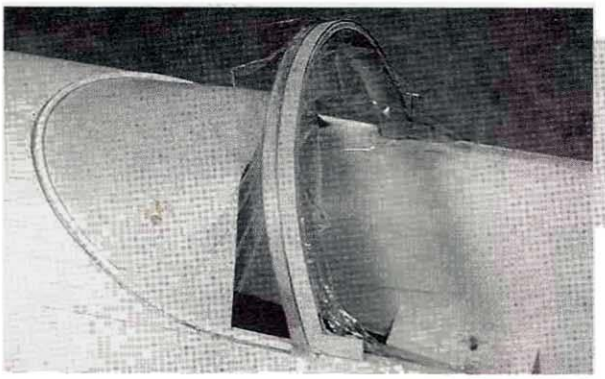


5 The Plexiglas can be removed after the third lamination of 1/64-inch plywood has been glued in place. The three laminations are now rigid enough to hold their shape while the additional laminations are glued in place. Note that the thickness of the frame has increased to the point at which the ends of the pieces are now being glued to the top of the trim strip. Notice that the frame pieces vary in length up over the trim and then down again on the inside.

6 The main windshield frame has been completed and sanded. I used four layers of 1/64-inch plywood and four layers of 1/32-inch plywood. You'd be surprised at how fast laminated plywood builds up strength. The windshield frame is only 3/16-inch thick, but it is strong enough to be used as a handle to carry the airplane. Note that the last lamination is on the inboard side of the trim.

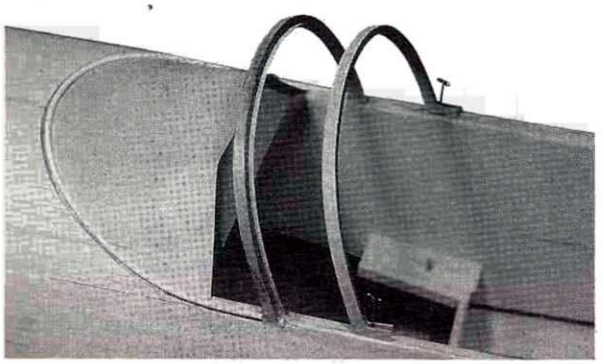


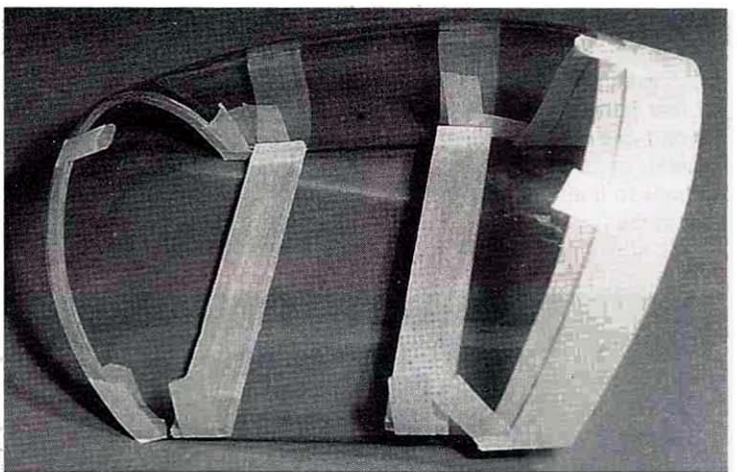
7 One last lamination of 1/32-inch plywood is added to the inside of the frame to form a "lip" on which the movable portions of the canopy will rest. Note that it is angled slightly forward, the same way as the main frame is. This will provide a good fit to the movable portion of the canopy. At this time, the lip extends rearward and is the same width as the main frame. It will be used as a building form for the next step and can then be sanded to a narrower width if desired.



8 With the windshield frame protected with plastic food wrap, the front frame of the main canopy is built up. Use the pattern, slightly enlarged, to make the plywood parts. Notice the 1/32-inch-thick tabs extending rearward at the bottom of the new frame. These are used to "capture" the side rails when the front and rear frames are connected.

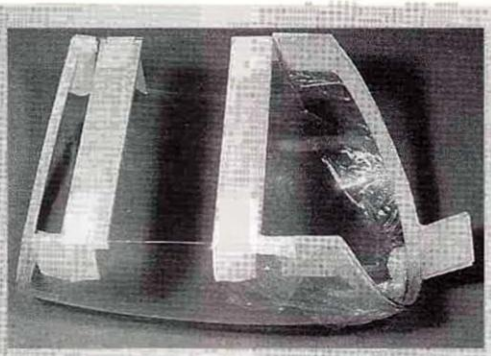
9 The front frame member has been completed and removed. I used 1/64-inch-thick plywood for the first two laminations and finished with five laminations of 1/32-inch plywood. The resulting thickness is 3/16 inch, which matches the thickness of the windshield frame. The 1/32-inch "tabs" are clearly visible. The outer laminations form these tabs, which extend about 1/4 inch beyond the inner laminations.

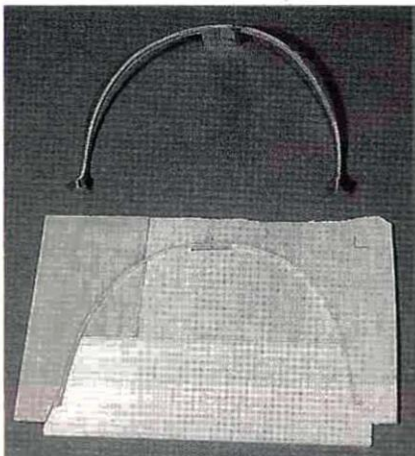




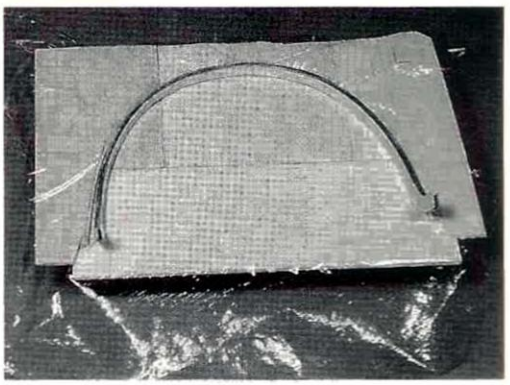
10 The paper pattern is made for the rear frame member. Because the Plexiglas is quite flimsy with both ends open, it needs to be held in its correct shape while the pattern is being made. The front frame member is taped into place in the Plexiglas. Two pieces of wood, the same width as the fuselage, are also taped in place to help hold the shape correctly. The pattern is then marked, removed, trimmed and used to make the plywood laminations.

11 With the canopy still taped in shape and protected with plastic food wrap, apply the first three laminations. Take care not to push the canopy out of shape while making the laminations. Note that at this stage, the plywood is oversize, including the tabs where the side rails are connected. This particular canopy is hinged at the rear, so I added a tab to support the hinge.

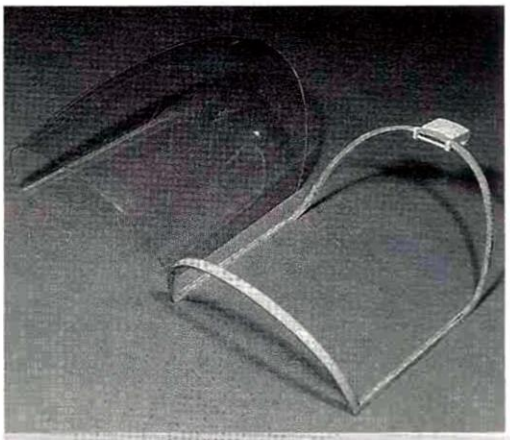




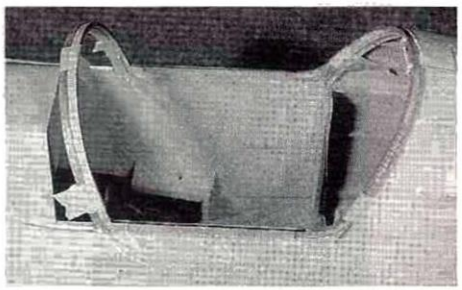
12 The frame is still quite flexible because the lower ends are not connected. I made a simple jig of scrap balsa to hold the frame in shape while I glued the additional laminations into place. The shape of the jig is determined by placing the frame on a piece of paper and, without distorting it, drawing a line around its outer curve. In this particular case, I had to cut a slot in the jig for the hinge tab; this allowed the frame to lie flat against the jig.



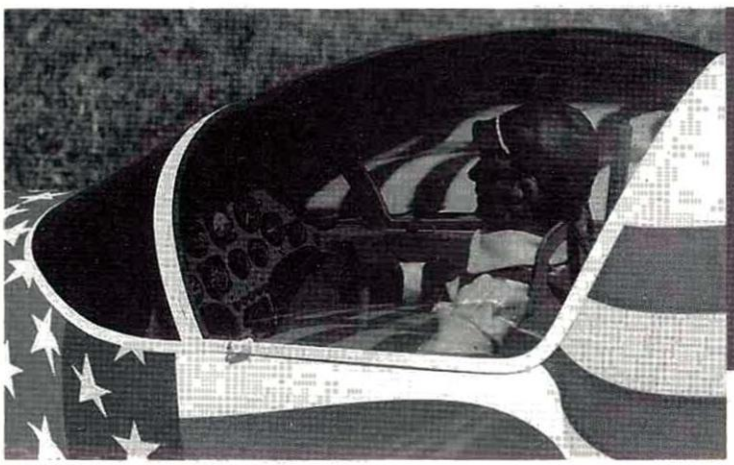
13 Protect the jig with plastic food wrap while you apply the additional laminations. Notice that the tabs, like those on the front frame, have been made by making the two outer 1/64-inch laminations and the inner 1/32-inch lamination extend about 1/4 inch farther forward than the others.



14 The framework is assembled in the fuselage opening to ensure a good fit. The fuse is protected with plastic food wrap, and the front and rear members are taped into place. The side rails are measured and installed. A single piece of plywood can be used for the center part of the side rails. In this case, I used 1/8-inch ply so the thickness would match that of the front and rear frames. Then, 1/32-inch plywood (the same thickness as the tabs) was used to fill out the side rails to the thickness of the other frames.



15 The frame assembly is complete and almost ready to be attached to the Plexiglas. The frame becomes quite rigid when the side rails are attached. It should be sanded and painted before it's attached to the Plexiglas. Of course, to ensure a good glue bond, don't paint the area where the frame will be attached to the Plexiglas.



16 Making the outer frame, which goes over the Plexiglas, is easy. You made nearly all the patterns for it when you made the inner frame. Now you'll need only to make a pattern for the frame that goes around the front of the windshield where it meets the fuselage: do this by holding a piece of paper tightly against the windshield while you run a fingernail around the opening. Make the outer frame pieces slightly larger than the patterns for the inner frame, then trim to fit as you go. I used 1/64-inch-thick plywood for the outer frames.

The result looks attractive and professional, and you have the added bonus of easy access to the R/C equipment.

MODEL AIRPLANE NEWS

FIELD & BENCH REVIEW

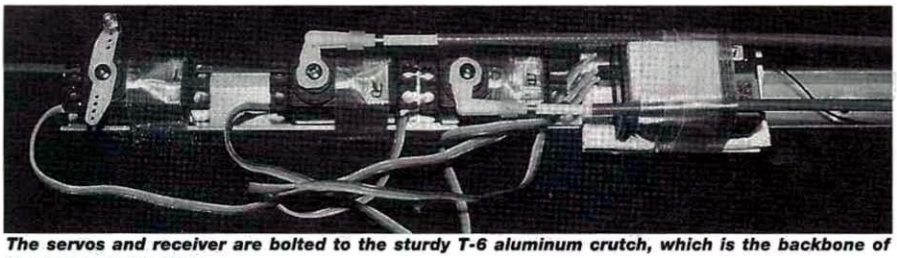
DURAPLANE DuraStik

by ROBERT JOSLYN

Easy-build aerobat

DURAPLANE* AIRPLANES are well known for their durability, easy construction and low cost; the DuraStik 40 is no different. Like the previous DuraPlane models, the 'Stik is built around a sturdy PVC fuselage and a T-6 aluminum main channel, and it features foam wings reinforced with an aluminum spar, duraluminum landing gear and an adjustable engine mount.

The DuraStik comes neatly packaged in what I consider an ARF-size box. The overall wood quality is very good, and the balsa stab and elevator, and fin and rudder assemblies are bundled separately, as are the hardwood spars, balsa trailing edges (TEs) and ailerons. The plywood wing joiners, firewall assembly and wingtip assemblies are die-cut, and the plastic wing shield and front deck assemblies are molded. The foam wing is in its own compartment with a neat little foam packing piece. Don't lose this, as it is part of the wing assembly.

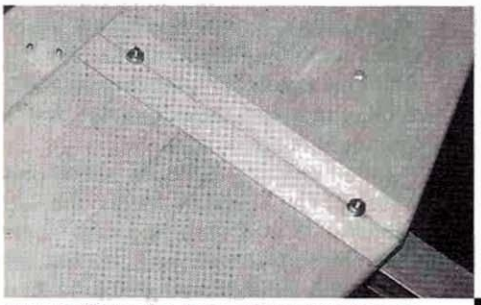


The servos and receiver are bolted to the sturdy T-6 aluminum crutch, which is the backbone of the DuraStik fuselage.

The 20-page construction manual is well-written, easy to follow and has photos, diagrams and many helpful hints on assembly, painting and covering.

GETTING STARTED

The first step is to build the tail feathers. I checked the two shaped vertical fin pieces for trueness and had to shorten the rear fin piece to match the front. I trued up the mating edges and glued the pieces together with medium CA, sanded the assembly smooth and rounded the leading edge (LE) with a contour sander. I then glued the two



The stabilizer has been attached to the aluminum crutch with two 4-40 bolts and reinforced with plywood.

balsa fin base pieces to this assembly and trimmed the base assembly to match the front contour of the fin.

I temporarily joined the fin and rudder with three CA hinges and rounded the edges with a contour sander to match the edge of the fin. Then I removed the rudder and shaped the LE of the rudder to a "V" using the contour sander. I added the control horn, then set the fin/rudder assembly aside.

The stab and elevator are assembled similarly to the fin and rudder. I used medium CA to glue a 1/16-inch plywood plate to the bottom of the stabilizer assembly. The instructions call for four hinges to be used to attach the stab and elevator; however, for peace of mind, I opted to use six hinges.

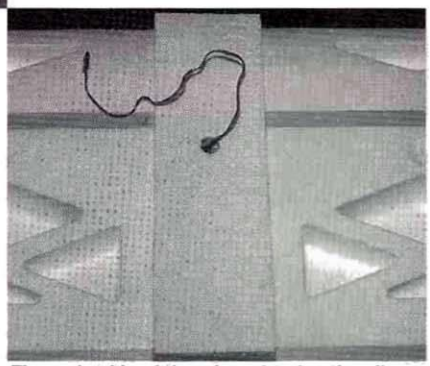
I checked the aluminum fuselage U-channel for burrs and cleaned them up with a metal file. You must drill two 1/8-inch holes in the side of the fin's base so it can be mounted to the channel. The instructions tell you to insert the fin in its proper position, mark the locations of the holes, remove the fin and drill it. Because drill bits have a tendency to "walk" in balsa, I decided to leave the fin in the channel and drill the 1/8-inch holes using a Robart* hinge point drill guide, which produced two very clean drilled holes. The two holes on the bottom of the fin will be taken care of later.

The stab is mounted with two 4-40 bolts. I used a drafting triangle to ensure that the stab was square to the fuselage and then located the required holes as per the instructions. I epoxied the mounting bolts to the fuselage channel and, after the epoxy had dried, temporarily mounted the stab to the fuselage.

I used a Dremel tool and a drum sander to clean up the two holes on the bottom of the fin assembly so they would clear the bolt heads and temporarily mounted the fin.

FUSELAGE ASSEMBLY

I laminated the firewall with epoxy and four plywood pieces. After it had dried, I positioned and installed the engine



The underside of the wing, showing the aileron servo wire that's routed through the foam wing saddle.

mount, and I mounted the engine at 90 degrees for a sportier appearance and to prevent exhaust residue from crossing the top of the wing and contaminating the aileron servo. (The instructions don't give a specific location for mounting the engine.) I drilled the mount but later had to move the engine forward, after I had checked the CG.

I located the eight 3/32-inch holes required to mount the firewall to the fuselage. These holes come pretty close to the back edge of the firewall assembly, so I added a plywood frame around the back of the firewall to beef it up. Perhaps a dimension of 3/16 inch would be a better choice. I installed a Du-Bro* 8-ounce tank.

I chose to epoxy the two plywood landing-gear plates in place. The aluminum landing-gear mounting holes were off center, so I re-drilled them; otherwise, the gear would have been offset to one side. I installed the radio equipment in the aluminum U-channel as per the instructions and made and connected all the control rods. This completed the fuselage assembly.

SPECIFICATIONS

Model name: DuraStik 40

Type: sport

Manufacturer: DuraPlane

Wingspan: 56 in.

Wing area: 594 sq. in.

Weight: 5 lb., 14 oz.

Wing loading: 22.6 oz./sq. ft.

Length: 49 in.

Engine recommended: .40 to .46 2-stroke w/muffler, or .48 to .52 4-stroke

Engine used: Magnum PRO 45

Radio req'd: 4-channel with 4 servos

Radio used: JR Max6

Prop used: APC 11x5

List price: $109.99

Features: the DuraStik 40 fuselage consists of a PVC fuselage section, a molded plastic wing fairing, an extruded U-channel aluminum tail boom and balsa tail feathers. The foam wing is reinforced with hardwood spars and a plywood wing joiner. The wing assembly also includes a molded plastic wing shield piece and balsa trailing edges and ailerons. A complete hardware package, prebent main landing gear and CA hinge material are also included.

Comments: the DuraStik 40 is a fully aerobatic model that will go where you point it. You'll need to have basic building skills to assemble the kit.

Hits

- Excellent overall wood quality.
- Plywood die cutting was very good.
- Molded foam wing.
- Very good assembly manual with lots of pictures and illustrations.

Misses

- Mounting holes in landing gear were not centered.
- Elevator was split and cut on one end.
- Foam wing saddle was too short and did not match the wing airfoil.
- Plastic wing shield does not protect the wing leading edge.

FLIGHT PERFORMANCE

I set up all control surface throws as specified in the instructions. Fellow modeler and friend Rick Bell and I set up the Magnum engine the day before the flight testing. We needed about three turns in on the low-speed adjustment to set it for a good idle. The high-speed needle was set for about 12,600rpm. That engine with an APC* 11x5 prop had a lot of pull. I relaxed my hold on the model, and the little bugger wanted to become airborne.*

• Takeoff and landing

I taxied the DuraStik out onto the runway for the takeoff run. The ground handling was responsive and tracking was very good. I put in a couple of clicks of down-elevator trim before takeoff, just in case the model wanted to climb rapidly. I prefer to hold back pressure on the elevator stick if needed. I advanced the throttle to full and started the takeoff roll. To maintain a straight takeoff, I had to add a little bit of rudder to compensate for the crosswind. I pulled back a little on the elevator stick; the plane rotated and became airborne.

I set up for the landing using the traffic pattern for our flying field. I needed a little rudder to compensate for the crosswind. The final approach was like riding on a rail; however, I decided to do a go-around because of a high idle. The idle was lowered, and I made another approach. The plane made a smooth descent and touched down on the runway. It bounced back into the air, and I applied just a little throttle; it settled back onto the runway.

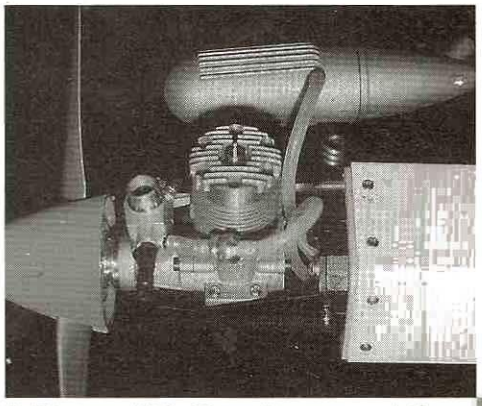
• Low- and high-speed flight

After climbing to a comfortable altitude, I checked out the trims. I needed a couple of clicks of left aileron trim and took out the down-elevator trim that was put in before takeoff. The model is now trimmed for straight and level flight.

I throttled the engine back, and the aircraft started to slow with no big changes in altitude. I did some low passes down the centerline of the runway. All controls remained effective, and the plane needed a bit of up-elevator to keep the altitude constant. The transition from low speed to high speed did not cause any change in altitude. The DuraStik just accelerated smoothly and continued on its heading.

• Aerobatics

Aileron rolls were axial, with the roll to the right a little slower than to the left. Down-elevator was needed to sustain level flight while the plane was inverted. Stall turns to the left and right were crisp and clean. Snap rolls were just right with the throws recommended, and the model had no tendency to over-roll. I tried a flat spin but got a spiral.

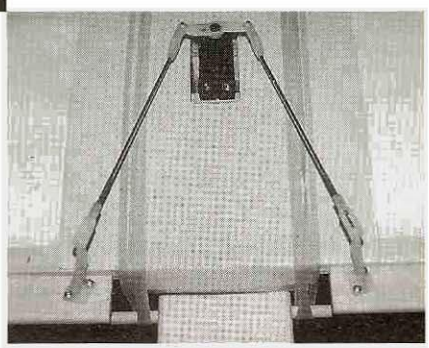


A Magnum PRO 45 engine powered the DuraStik nicely.

THE WING

I used 12-minute epoxy to join the two plywood wing joiners and aliphatic resin to assemble the rest of the wing. I used a strip of 1-inch-wide masking tape on the foam wing to protect it while I sanded the TEs and wing spars. The ailerons were finished in the same manner as the other control surfaces.

The 1/8-inch plywood servo rails supplied do not give enough clearance for the aileron pushrods with the plastic wing skin installed, so I added a 1/4-inch piece on top of the supplied pieces. I also embedded a 6-inch-long, 1/4-inch dowel in the LE of the wing to protect it from the rubber bands that are used to attach the wing to the fuselage (the plastic wing shield did not wrap around enough to protect the LE). I finished the wing assembly by attaching the foam wing saddle (remember the packing piece?) with epoxy. I added a piece of scrap foam to the rear of the wing saddle to extend it to the TE of the wing and beveled the rear edge to provide clearance for the rubber bands. I temporarily installed the plastic wing shield; this is not permanently installed until after it has been painted and the wing has been covered. I mounted the wing to the fuselage with rubber bands and trimmed and fit the molded front deck to the fuselage and wing.



This top view of the wing shows the aileron servo and the plastic wing shield that protects the foam wing from being damaged by the rubber bands that hold it in place.

At this point the model was completely assembled, so I checked all control surfaces for proper operation.

FINISHING UP

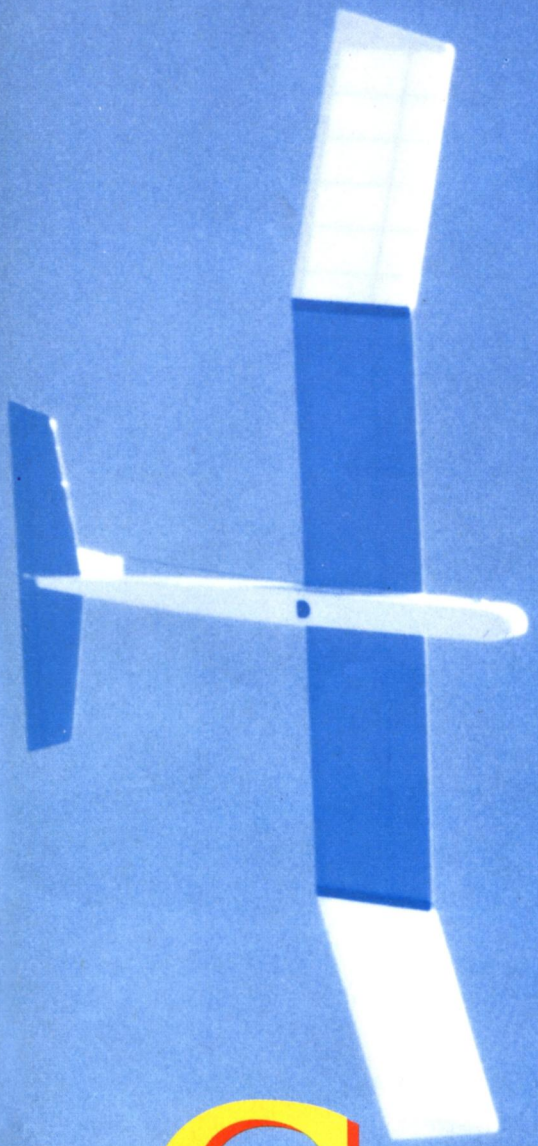
I had to take the model apart to paint it. I used Top Flite* red and white EconoKote to cover the wing, ailerons and tail surfaces. I painted the PVC fuselage and plastic pieces with Top Flite's Missile Red and used Carl Goldberg* 1/4-inch-wide black striping tape and Major Decals* WW I German markings for trim.

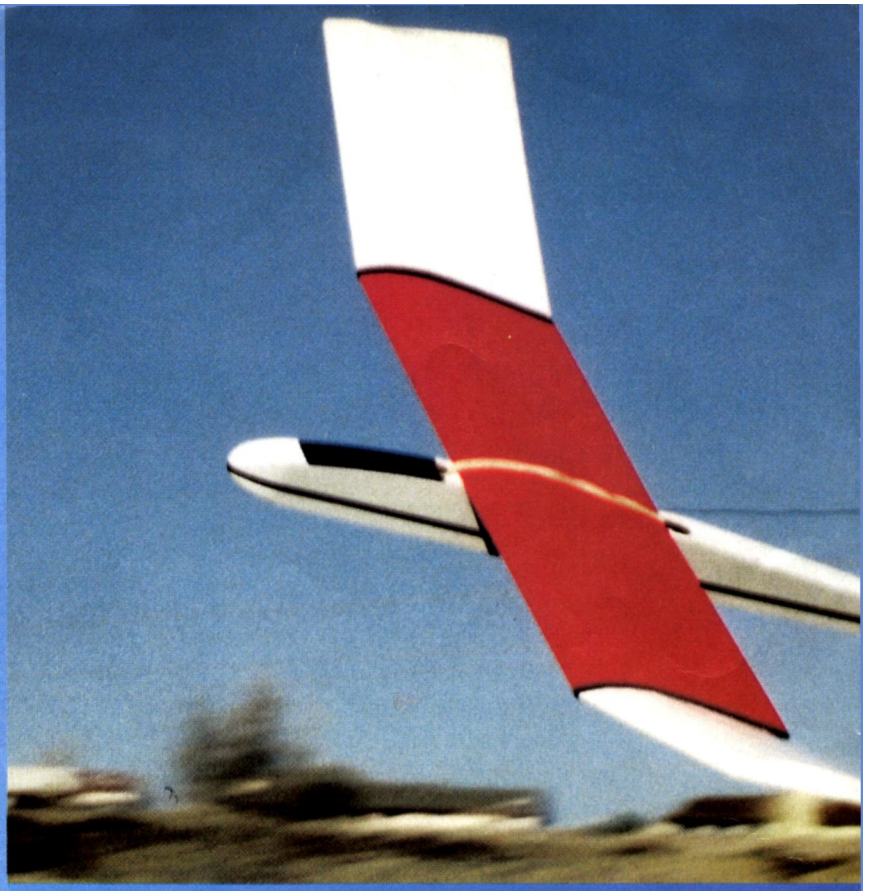
After everything had been painted and covered, I glued in all the hinges with CA. I installed the wing seating tape and set the wing on the fuselage, then attached the wing shield with Hobbypoxy* 2 and held it in place with rubber bands until it had dried. I attached the front deck with silicone rubber and held it in place with electrical tape until it had dried. I installed a Du-Bro 2 1/4-inch spinner and the propeller. For the model to balance at the specified point, I had to move the engine forward and add about 2 ounces of lead to the back of the firewall.

CONCLUSION

The DuraStik 40 features a semisymmetrical wing with no dihedral, which makes it fully aerobatic. Although it is a model that will go where you point it, it is not recommended as a first model or trainer. Although the DuraStik is classified as an ARF, it does not come with the usual accessories such as wheels, fuel tank and spinner. It also requires the builder to have some basic building skills. If you like the DuraPlane-type models, then this would be a good choice for a second aircraft to advance your flying skills or just to have some "plane" fun.

**Addresses are listed alphabetically in the Index of Manufacturers on page 118.*





SUN RIDER

A SIMPLE SAILPLANE FOR THE FIRST-TIME BUILDER AND FLYER

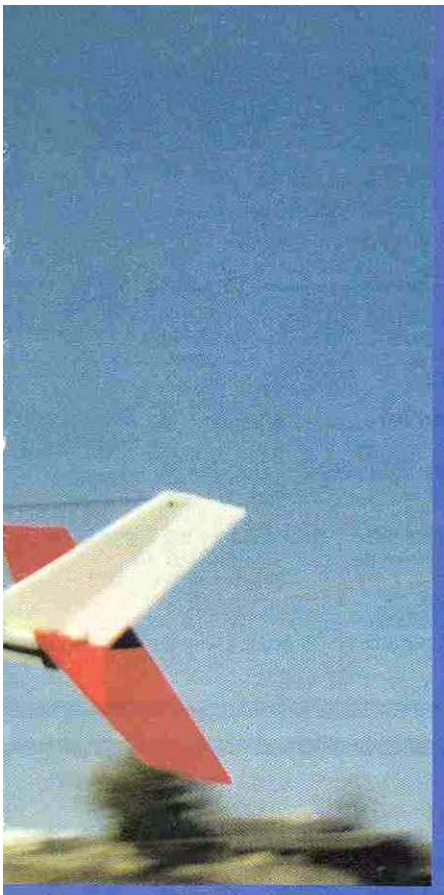
by JIM SIMPSON

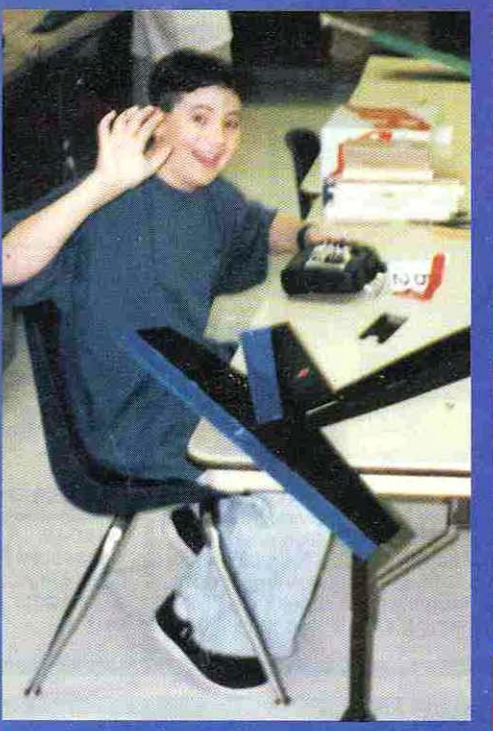
IN 1996, I was asked to direct a program titled "Joy of Soaring" for Sandia Prep—a private school in Albuquerque, NM. The program was set up to teach inexperienced nine to 14-year-olds slope soaring, but in June and July winds cannot be scheduled to be dependable. I suggested a change to a simple, 2-channel, 2-meter sailplane.

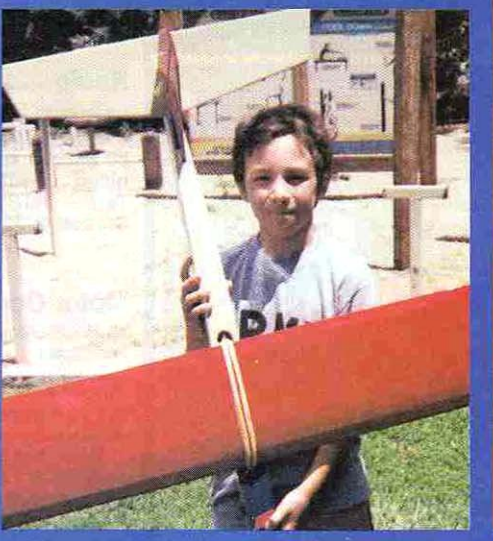
That summer, we built and flew 39 House of Balsa* 2x6 gliders. I was asked to continue the program through the academic year, and we decided to build one of my designs as a proof-of-concept model. The students came up with the name "Sun Rider."

I cut 50 kits (of which we used 40), and we asked the local hobby shops for supplies. The JR* 400 radio was used extensively. As of the fall semester, our program has taught 63 kids to build and fly. We formed an AMA chartered club for the students and their friends and hold club meetings on the first Saturday of every month.

The model is intended as a trainer and is most often flown on football or soccer fields. There is ample room under the wing center section for ballast, if you would like to use it for light-wind slope flying. Also, the nose block could be left off and the model modified for an electric motor or a glow engine, if preferred.







Above left: Kendrick Dane is all smiles for the camera with his just-finished Sun Rider.

Above right: nine-year-old Evan Scott shrinks the covering on his Sun Rider wing panel.

Right: Alexander Zannes shows off his Sun Rider—his second model.

Bottom left: Danny Orasco covers his fuselage.

Bottom right: Danny Orasco, Jonathan Birkholtz and Evan Scott (left to right) happily show off their Sun Riders.

SPECIFICATIONS

Type: entry-level 2-channel sailplane

Wingspan: 72 in.

Length: 40 in.

Wing area: 650 sq. in.

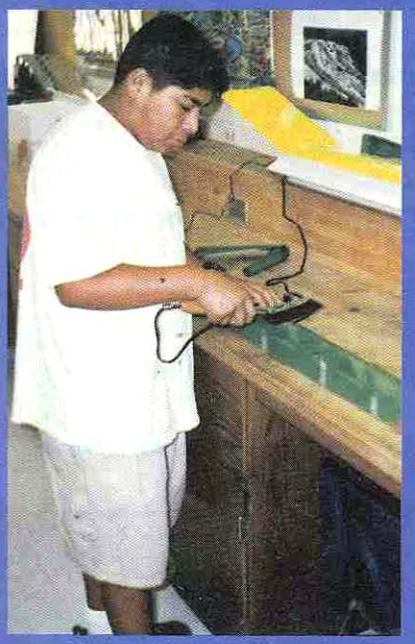
Weight: 26 oz.

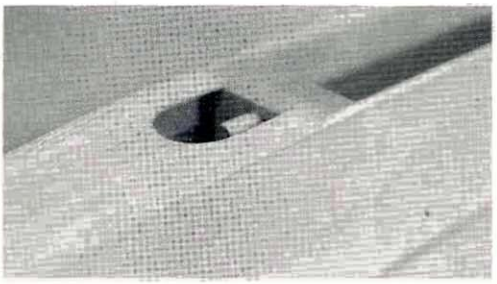
Wing loading: 5.7 ounces per square foot

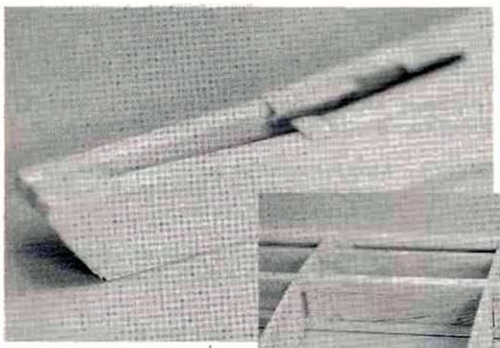
Airfoil type: Flat-bottom 9 percent section

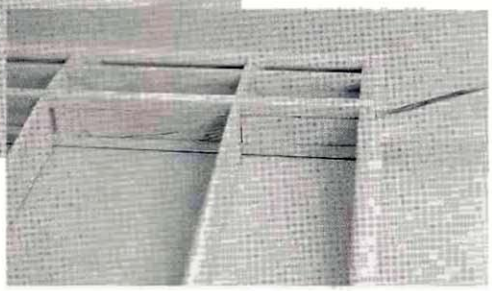
No. of channels req'd: 2 (rudder and elevator)

Comments: Sun Rider is an easy-to-build, 2-channel glider for first-time builders and flyers. Balsa and plywood are used throughout, and the three-panel wing has a flat center section. With some modification to the nose, an electric motor or a small glow engine could be used for power.









Top: the wing is held on the fuselage with rubber bands. Here, you see the aft attachment dowel.

Center: the aft fuselage, shown here with provisions for a removable screw on stab and fin—simple construction.

Bottom: the dihedral brace has been installed. Note the reinforcement tape that strengthens the joint.

MATERIALS	Part/ID (quantity)	Dimensions (in.)
Balsa	Vertical stabilizer/R1	3/16x4x11
	Aft fuselage bottom/F2	1/16x1 3/4x20 1/2
	Main formers/F4 (2)	1/8x1 3/4x2 1/2
	Aft former/F5	3/32x1 9/16x1 3/4
	Fuse sides/F6 (2)	3/32x2 5/8x36
	Fuse top/F8	1/16x2x16 3/8
	Wing saddles/F17	3/32x1/16x8 1/2
	Nose block/NB	2x2x2
	Wingtips/W1 (2)	3/16x2 1/8x8
	Trailing edges/W2 (2)	3/16x3/4x36
	Spar webs/W10 (21)	3/16x7/16x2 3/4
	Tri-stock fwd. wingtip blocks/W11 (2)	3/4x3/4x1 5/8
	Dihedral gauge/DG	1/8x1 1/4x3
	Wing ribs/W6 (32)	3/32x1x8 1/4
	Rudder/R2	3/16x2x9
	Horizontal stabilizer/S1	3/16x4x22
	Elevator/S2	3/16x1 1/4x22
Plywood	Fwd. fuse bottom/F1	1/16x1 3/4x14 1/2
	Nose former/F3	1/8x1 13/16x1 13/16
	Fuse doublers/F7 (2)	1/32x2 5/8x18
	Front hatch stay/F13	1/16x3/4x2
	Access hatch/F14	1/16x2x5 3/4
	Aft hatch stay/F15	1/16x3/4x2
	Hatch catches/F16 (2)	1/16x3/4x2
	Dihedral braces/W7 (2)	3/16x3/4x4
	Spar doublers/W8 (4)	1/32x3/4x1 3/4
	Center planking/W9	1/32x2x9
Basswood	Stab mount/F9 (2)	1/8x3/8x6
	Towhook mount/F10	1/4x1/2x1 3/4
	Former doubler/F11 (2)	1/4x1/2x1 3/4
Hardwood	Wing hold-downs/F12 (2)	1/4x7/8
	LE dowel/W5 (2)	1/4x36
Spruce	Main spars/W3 (4)	3/16x3/16x36
	Sub-spars/W4 (4)	1/8x1/8x36
Metal	Towhook/TH	3/32-in.-dia. threaded
	Sheet screws/SC (4)	No. 4

You'll also need: small, molded-nylon control horns/CH (2); plastic no. 503 pushrods/PR (2); rolls of covering material (2); radio system with two servos; Upstart launching system; all the usual construction tools and accessories.

CONSTRUCTION

You'll need a flat building surface that can be as small as 1x4 feet (half a standard ceiling tile). For beginners, I recommend yellow carpenters' glue. The step-by-step instructions are designed to be used as a checklist as you build. Refer to the bill of materials and the plans as you cut out all the parts needed for the Sun Rider. You may find it helpful to mark each of the parts to help identify them during construction.

FUSELAGE

❑ Cover your building board and plans with wax paper, then arrange the two fuselage sides (F6) and two doublers (F7) so that when you glue them together, you will have a right side and a left side. Use epoxy or 3M 77 contact cement; do not use yellow or white water-based glue, as these may warp the balsa and plywood.

❑ Draw lines across the bottom sheeting to mark where the bulkheads will go. Put a strip of masking tape (centered) under F1 and F2 at each of the four former locations, pin two parts into place over the top view, and glue them together at the joint.

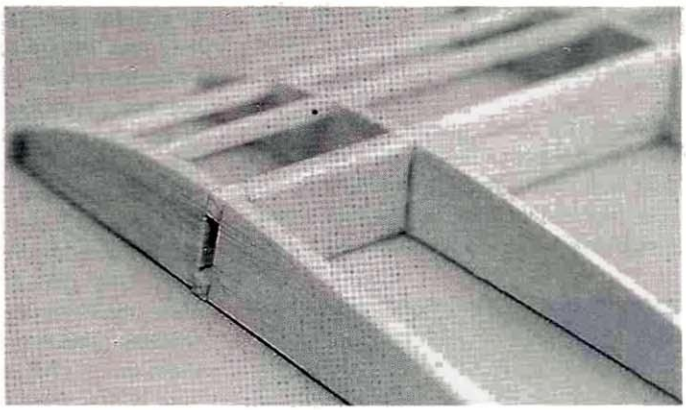
❑ Assemble the two F4 formers, doublers (F11) and dowels (F12) as shown on the plans.

❑ Mark the locations of the formers on the right fuselage side, then transfer the marks to the left side. Check the formers to be sure they fit the sides exactly; if they're too long, sand the bottom of each to fit.

❑ Glue stab mount F9 to the inside of each fuselage side as shown on the plans.

❑ Glue the right fuselage side to the fuselage bottom and also pin it in place. Glue formers F3, two F4s and F5 into place, then add the left fuselage side. Use the masking tape (already in place under the bottom sheeting) and pins to hold the fuselage assembly in alignment until dry.

❑ Install the pushrod outer tubes and glue into place. Add the aft, top fuselage sheeting (F8) before removing the fuselage assembly from the board. Glue the front hatch stay (F13) into place across the top of the fuselage nose and flush with the front. Use the hatch piece (F14) to mark where the front of the aft hatch stay (F15) will be. Leave a little gap, and glue the aft stay into place. Glue the hatch tabs (F16) into place on each end of the hatch as shown on the plans. The front hatch catch is 1 3/4 inches long, and the aft ones measure 3/8x3/4 inch. They need to protrude only about 3/32 inch, making it easy to install and remove the hatch. Finally, add the wing-saddle strips (F17) to the top of each fuselage side for the wing to rest on.



Here's the outer rib of the wing center section. Note the opening cut between the upper and lower spars. This is where the plywood dihedral brace goes.

CONSTRUCTION: SUN RIDER

❑ Glue the nose block (NB) into place. Carefully mark the location of the towhook mounting block (F10) and glue it into place. The towhook location is critical because it affects the launch height to some degree. Sand the entire fuselage smooth and slightly round the corners to make it look good. Wrap filament tape around the fuselage at the three places shown on the plans. It is best to center the tape strip on top and make the overlap across the bottom. This will make your plane much stronger and will add hardly any weight. Set it aside until you are ready to cover.

TAIL GROUP

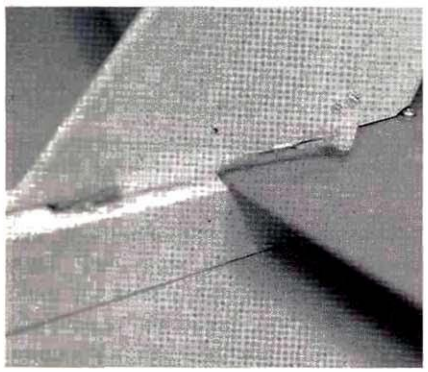
❑ Tape the fin and rudder (R1 and R2) together, then sand the edges round, except the bottom edge. Look at the plans (side view) to see how the V-shaped LE and TE allow the tail surfaces to move in both directions. Sand the edges to form the V-shape and test the tail to be sure it will swing easily from side to side.

❑ Tape the elevator and stabilizer (S1 and S2) together and do the same as you did above (R1 and R2).

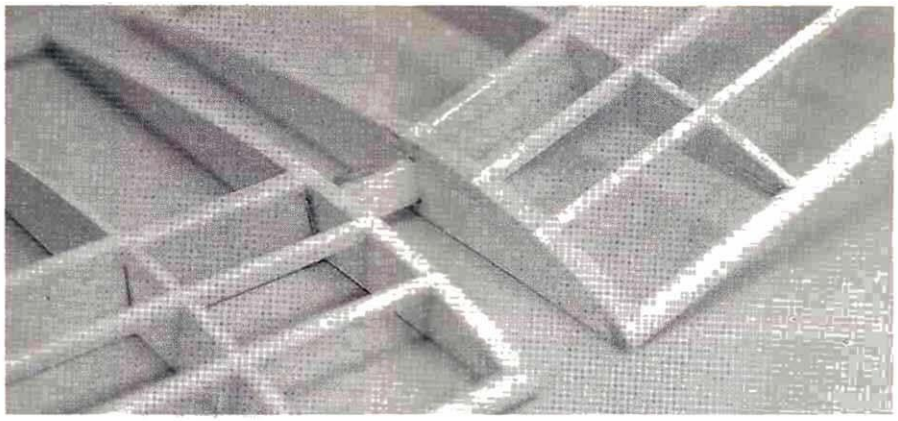
WING

❑ Cover the large, center, wing-section plan with wax paper and pin the bottom main spar (W3) into place. Use some wing ribs (W6) to gauge where the TE piece (W2) should go and pin it into place. Notice that the wing ribs at each end of this panel are made of 3/16-inch balsa. Sand the bottom of the ribs to allow them to be tilted inward for the dihedral angle. Do not glue the end ribs into place.

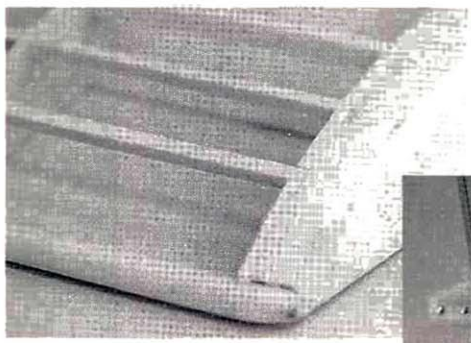
❑ Start at the center, glue one rib (W6) into place on the spar and in the TE notch. Cut a spar web (W10) to fit, and glue it to the spar, then add the next rib. Continue gluing a web and then a rib into place out to the next-to-last rib on each end of the panel. There are no spar webs between the next-to-last ribs and the thick end ribs. Remove the thick end ribs and glue the top main spar into place.



Here's the rudder-linkage setup—simple and straightforward.

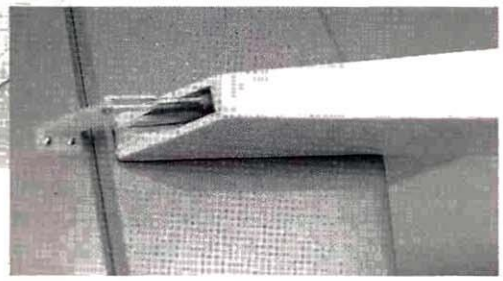


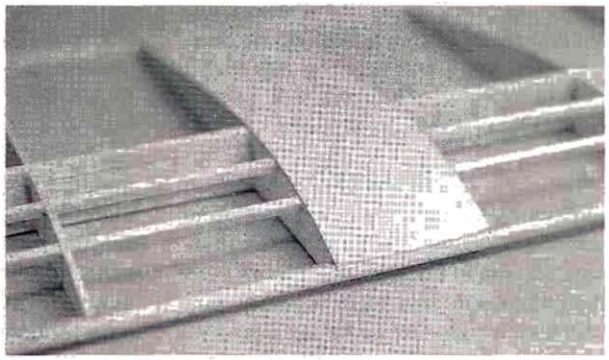
Above: when the wingtip panel is attached to the center section, you slide the dihedral joint into the slot and glue the panels together. The two outer ribs are angled to allow the proper dihedral angle.



Left: the wingtips have been added to the outer wing panels. A balsa block is added to the LE to help shape the tip.

Below: the elevator pushrod exits through the open aft end of the fuselage.



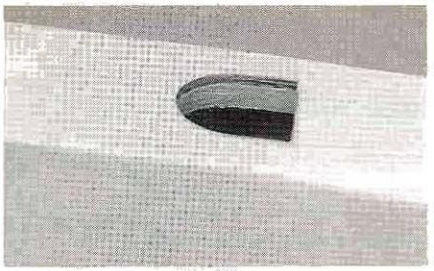


The middle of the wing center section is capped with plywood to strengthen the area over which the attachment rubber bands will go. The fore and aft edges must be sanded so it blends into the wing.

❑ Find the dihedral gauge (DG) and use it to adjust the end ribs so they lean inward toward the center of the panel, and then re-pin them into place. Carefully glue the spar doublers to the spar ends, making sure that no glue gets inside the tunnel that is formed by the doublers. Glue the LE sub spars (W4) into place, then glue the LE dowel (W5) into position. Glue the plywood center-section sheet cover (W9) into place. When the glue is dry, remove the panel from the board and use a modeling knife to cut out the part of the thick ribs that is between the top and bottom spars so that the dihedral brace (W7) will slide into the tunnel between the spars. Do not glue; just be sure it is a nice fit. It will be glued into the tip panels after they have been built.

❑ The tip panels are built in a similar way to the wing center section. Once you've cut the opening in the end rib, glue the dihedral brace to the bottom main spar, then pin both pieces of the thick rib into place and use the dihedral gauge to get the proper angle. Glue the wingtip piece (W-1) into place flat on the board and against the end rib.

❑ Glue the top main wing spar into place, then glue the forward wingtip block (W11) into place as shown on the plan; follow this with the LE sub-spars, just as you did in the center panel. Glue the LE into place, and when the structure is dry, remove it from the board and trim the inboard end



After the fuselage has been covered, the towhook is screwed into place. Note the finger-hold opening in the bottom of the fuselage.

flush with the rib. Build the other tip panel in the same way.

❑ Carefully sand all the wing panels, and make sure that the tips fit properly to the center section. Carefully glue the dihedral braces into the tips, then wrap the joints with two wraps of filament tape.

COVERING AND FINAL ASSEMBLY

❑ Run your fingers over the entire outer surface of the plane to feel for any imperfections; if you find any, sand them smooth. After you have sanded, remove all the balsa dust. Vacuum the frame, or use a tack-cloth, which you can buy at an auto-parts store. Cover each part separately, and take the time to do a good job. Hinges for the tail surfaces can be made of 1-inch-wide strips of the covering material itself, or you can use conventional hinges.

❑ Install the nylon control horns as shown on the plans. Notice that the elevator horn must be centered to line up with the control rod which comes out of the aft fuselage opening. The rudder horn goes at the bottom of the rudder. Both horns should be installed so that their holes are even with the hinge line.

❑ Clean out the rudder slot and the notch in the stab and remove the covering from the places where balsa will touch balsa. Block up the stab so it's aligned properly and glue it into place. Do the same for the rudder and fin. Re-check the alignment and allow the glue to dry completely.

❑ Fit the wing into place and hold it with rubber bands. Check its alignment with the tail surfaces and check the access hatch fit and ease of removal.

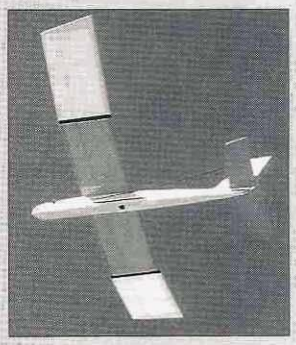
RADIO INSTALLATION

❑ Rub some glue on the radio compartment walls and on the bottom sheeting where the servos will touch when they're put in side by side at the far rear next to the

FLIGHT PERFORMANCE

• Takeoffs and landings

Before the first takeoff, we range-check the radio with the plane on the ground and the transmitter antenna collapsed. We expect at least 30 steps of separation and solid operation with the jitter in the controls. We also check to be sure left stick gets left rudder and back stick gets up-elevator. To be sure there are no surprises on launch, we check to see that the balance is right on and that the towhook is just slightly forward of the balance point.



First takeoffs are hand-tosses. Holding the plane above your head, throw it at a spot on the ground about 40 to 50 yards upwind and adjust the control trims to make the plane fly straight and flat to the aim point. This may take several tries and is definitely worth the effort. When we're satisfied with that, we hook it up to the "2-meter" high-start (also known as an upstart) and stretch the rubber to three times its length. Make sure that the plane is aligned straight into the wind. Wiggle the control stick and check the control surfaces for correct direction of movement. Throw the plane upward at an angle of 30 to 40 degrees above the horizon. This procedure ensures a perfect launch (takeoff) every time, and all you then have to do is "steer" it straight as it climbs to altitude. The plane levels off automatically, and the towline releases when the plane is straight above the rubber end.

This plane will also rise off the ground (ROG). To do this, you simply stretch the rubber as described above, check the controls, set the plane on the ground with the nose pointed toward the rubber (upwind), then let go.

Landings can be as automatic as takeoffs if you prepare for them properly. We do all our flying on soccer fields, and we teach the students to stay above the grass all the way to touchdown. When there is some wind, it is best to land straight into it. This plane is surprisingly strong, and bad landings usually result only in the wing's popping off—plus a lot of razzing from the other students and, sometimes, the instructors as well.

Stalls: when the balance point is too far back, the Sun Rider will stall easily. Recovery can be instantaneous if you simply turn the plane in either direction. When properly balanced, stalls can be induced by the application of too much up-elevator command, but again, turning in either direction stops the stall. Nose-heavy models do not usually stall but do not stay up very long, either.

• Low-speed performance

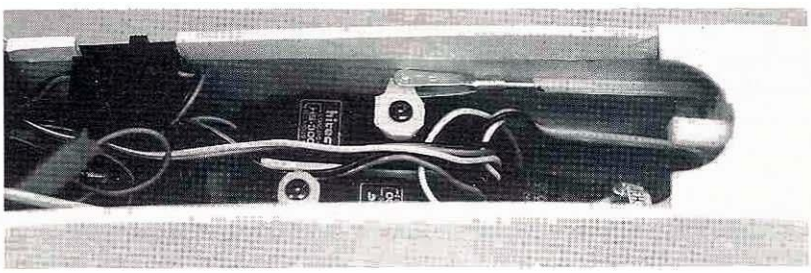
Low speed is normal cruise for this plane. We teach that the elevator is normally a speed control, and we demonstrate low speed on landing by pulling back on the control stick gently as we start the turn to final approach and holding some "up" all the way to touchdown.

• High-speed performance

This is discouraged, as it serves no useful purpose. Again, using a little down-elevator will speed it up (which is OK in level flight), but diving may cause sudden and complete wing loss followed by a nasty crash.

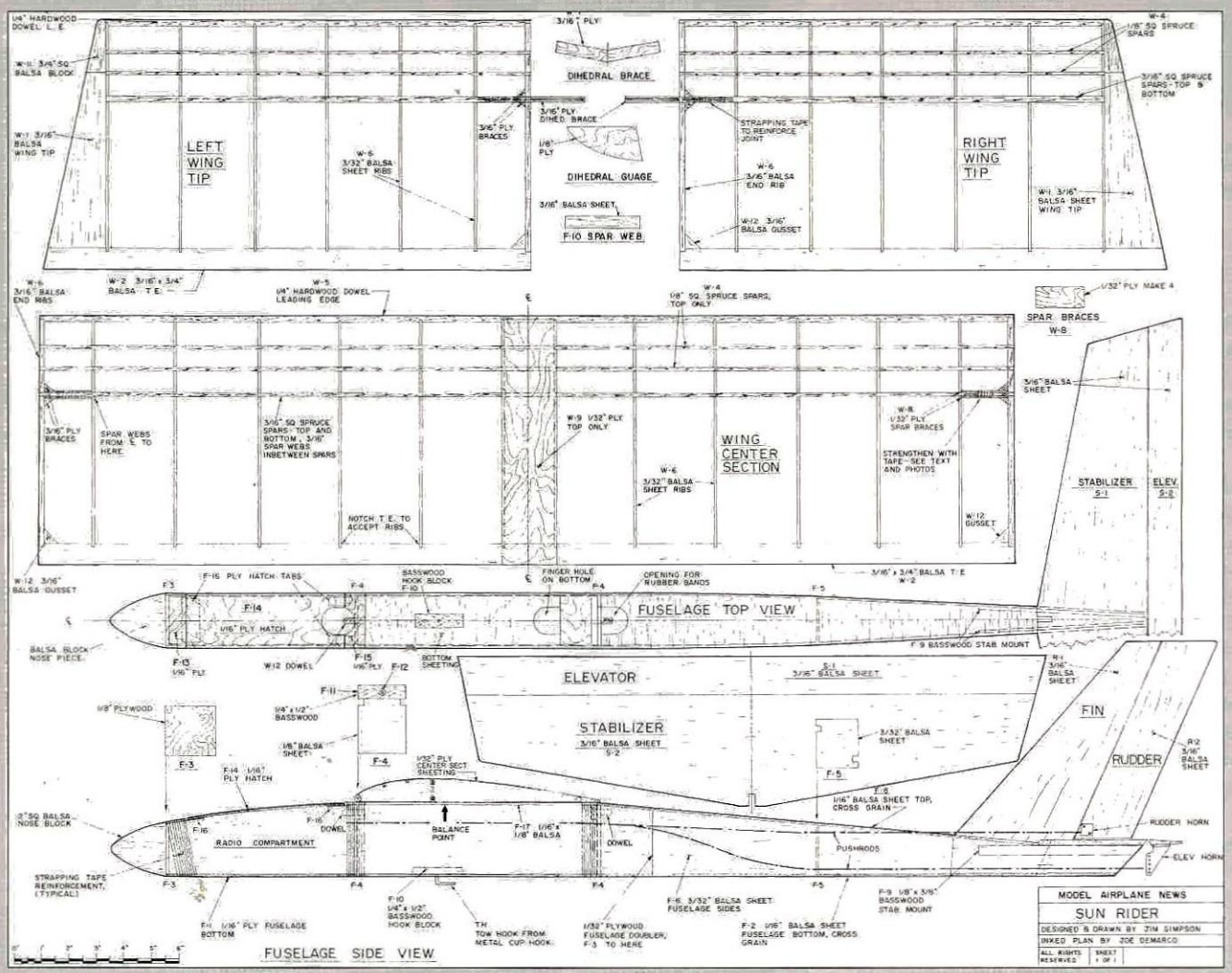
• Aerobatics

Loops are easy and common. The students love them, but it takes some practice to enter and recover in level flight. Stall turns are also easy until done in a vertical plane, where airspeed is required all the way over the top. Instructors and seasoned pilots fly inverted by entering from a half loop and recovering through the other half loop. Rolls can be done but require some "tweaking"—like aft center of gravity, maximum rudder deflection and entry from fast forward flight with a slight "pull-up" just before entering (best done with lots of altitude). We have never seen a Sun Rider spin.



Radio installation is tight, but everything fits nicely. Be sure to wrap your battery pack and RX with foam or bubble wrap.

To order full-size plans (FSP07981), see page 103.



former under the wing LE. When the glue is dry, cut some servo-mounting tape to cover one side and the bottom of a servo, and stick it into place. Do the same to the other servo. The servos are installed so that the servo wheels are toward the front of the plane. Check for proper operation.

❑ Assemble one end of a control rod and install it through the back, then connect it to the control horn. Use two Popsicle sticks (or scrap balsa) and two clothespins to hold the control surface in neutral, and mark where the front of the rod should be cut. Allow for the clevis, and be sure the servo arm is perpendicular to the clevis end and the pivot point. Disassemble the control rod, add the other clevis and reinstall it. Adjust the clevis and connect it to the control surface. Remove the clothespins and operate the control. Make sure it is in neutral and that the transmitter trim levers are in neutral. When you're satisfied with its operation, do the same for the other tail surface.

Be sure that both ends of both outer pushrod covers are securely glued into place with contact cement. Be very careful that no glue gets on or in the inner (yellow) rod. If both ends of each outer rod are not secured, the controls will be spongy or ineffective in flight.

❑ Wrap the battery pack with foam or bubble pack and position it in front of the radio compartment. Then install the radio switch; a neat trick is to mount it inside the nose compartment so you open the hatch to turn it on and off.

❑ Wrap the receiver in foam and stuff it between the battery pack and the servos. Route the antenna out of the nose compartment, under the wing and up to the top of the tail fin. Hold it in place there with a rubber band.

Operate the controls again with the plane completely assembled; check for smooth operation and correct direction. Balance the plane a little behind the main wing spar as shown on the plans. If necessary, add some weight in front of the battery. When the plane sits perfectly level, remove the wing and install the towhook as shown on the plans. Put the radio on charge overnight and dream about the test-flying that will begin tomorrow.

I'm sure you will enjoy your Sun Rider and, with a competent instructor, you will soon learn how to fly. If you already know how to fly, the Sun Rider will make a good sport model for relaxed afternoons at the flying field or school athletic field. Have fun.

**Addresses are listed alphabetically in the Index of Manufacturers on page 118.* ✚

George Meyers' Little Toot biplane (photo courtesy of Bob Banka's Scale Model Research*).

Biplane Design Part II:

More basic theory

by ANDY LENNON

HAVING TWO WINGS increases the options for aileron location. The simplest for a model is full-span ailerons, of 25 percent of the chord in width, on the lower or upper wing only. Another option is ailerons of 35 to 40 percent of semi-span in length and 25 percent of chord in width, on both upper and lower wings. They may be actuated by servos in both wings or by struts connecting the lower to upper ailerons, the lower being servo-operated.

Where the upper wing is larger than the lower, having ailerons only on the upper wing makes sense, as the greater span provides a longer moment arm.

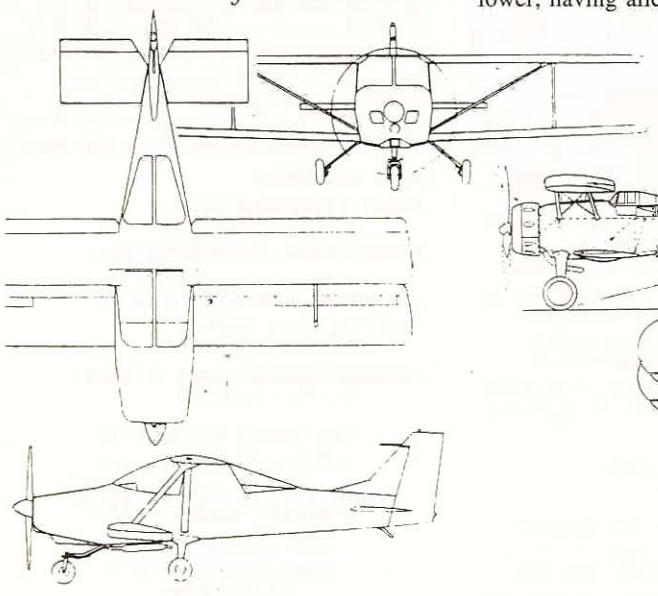


Figure 1. Durand Mk V.

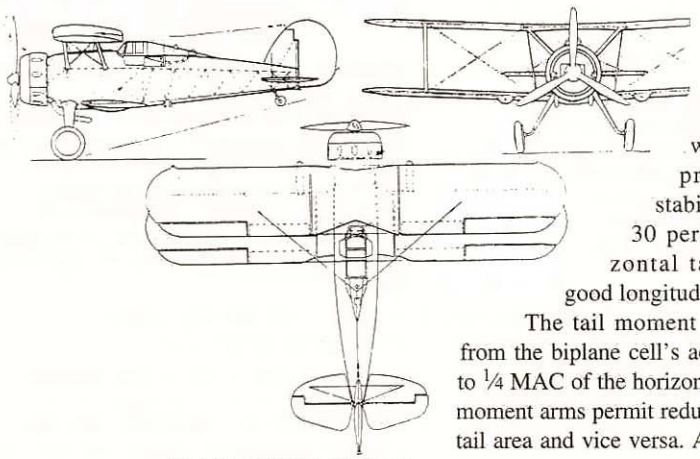


Figure 2. Gloster Gladiator.

One unique biplane, the Durand Mk V, used spoilers on the lower wing for roll control, since the trailing edges of both wings were devoted to plain flaps. The spoilers, located just ahead of the lower wing flaps, were 13 percent of chord in width and 47 percent of the wing's semi-span in length. They were proven to be very effective. Figure 1 illustrates this interesting biplane. Note the large gap and heavy negative stagger.

TAIL MOMENT ARM AND HORIZONTAL TAIL AREA

A tail moment arm of three times the upper wing's mean aerodynamic chord (MAC) for equal wings (or the mean chord for unequal wings) and a horizontal tail area of 15 percent of the biplane's total wing area will provide adequate stability. Elevators of 30 percent of the horizontal tail will provide good longitudinal control.

The tail moment arm is measured from the biplane cell's aerodynamic center to ¼ MAC of the horizontal tail. Larger tail moment arms permit reduction in horizontal tail area and vice versa. A formula follows

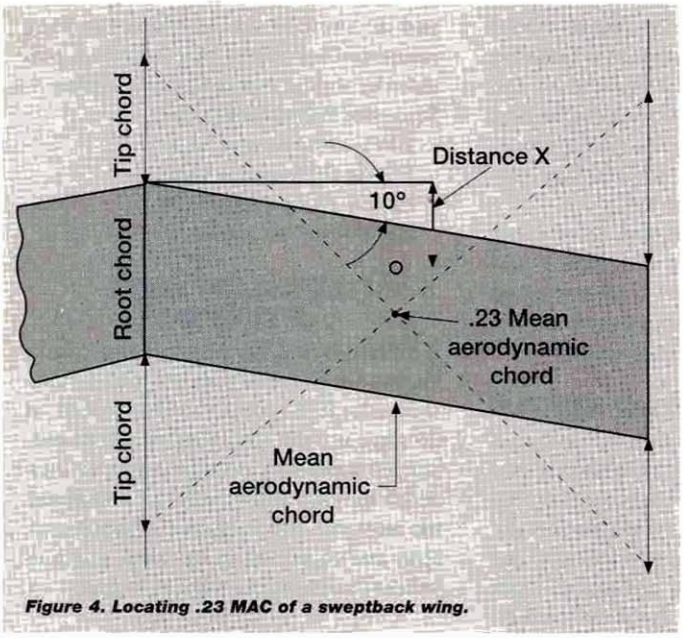


Figure 4. Locating .23 MAC of a sweptback wing.

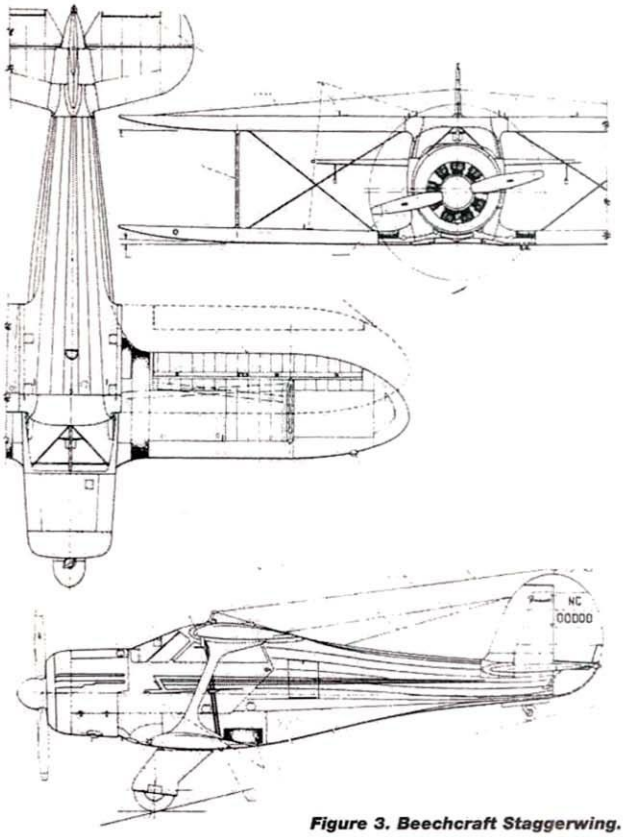


Figure 3. Beechcraft Staggerwing.

Horizontal tail area (sq. in.) =
3 x MAC (in.) x 0.15 wing area (sq. in.)

Tail moment arm (in.)

VERTICAL TAIL AREA

Since most biplanes are tail-draggers, it is recommended that the rudder area be no less than 50 percent of the total vertical tail area with throws of 30 degrees on both sides of neutral. This provides good control during takeoffs and landings to overcome the directional instability of tail-dragger landing gear.

WING LOADING AND FLAPS

Today's full-scale homebuilt aircraft, such as the Lancairs, Glassairs and Pulsars, achieve surprisingly good performance on modest horsepower. They feature: high wing loadings; small, moderately high aspect ratio wings; laminar flow airfoils; teardrop, pressure-recovery fuselages; retractable landing gear; close attention to parasitic drag reduction and smooth composite stressed-skin construction. Takeoff and landing speeds are reduced by the use of large slotted flaps.

Against this backdrop, the biplane is an antique. It is even being replaced by sleek monoplanes for aerobatics. However, to many modelers (including this author), the biplane is attractive. It is hard to find a more appealing small biplane than George Meyers' Little Toot.

Flaps are unnecessary on most biplanes due to their low wing loadings. The author knows of only three biplanes incorporating plain or split flaps, but none with slotted flaps. These are Durand's Mk V, the Gloster Gladiator (Figure 2) and the Beech Staggerwing (Figure 3).

This author favors higher wing loadings in the 25 oz./sq. ft. of wing area range, permitting smaller, sturdy models of very clean aerodynamics with power loadings in the 200 to 250 oz./ci of engine displacement range. Large slotted flaps permit takeoffs and landings at speeds in the low 20mph range.

For model biplanes with wing loadings of 20 oz./sq. ft. or less, flaps are unnecessary, unless the designer incorporates plain or split flaps, inboard of the ailerons, on both wings, to permit steep, slow landing approaches. Above 20 oz./sq. ft., flaps are the designer's option.

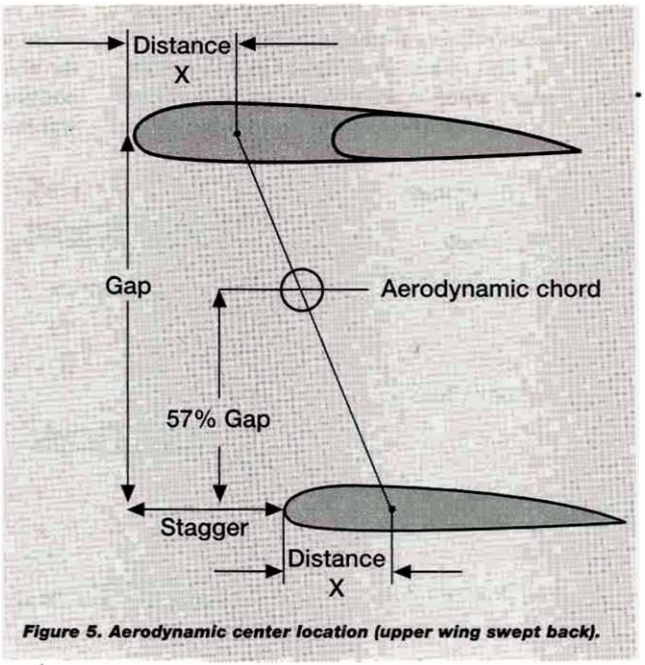


Figure 5. Aerodynamic center location (upper wing swept back).

DIHEDRAL

The two wings of a biplane multiply the options for dihedral: lower wing only; upper wing only; or both wings with dihedral. In all cases, 2 to 3 degrees of dihedral is adequate.

Large negative stagger favors lower wing dihedral only (see the Durand Mk V). This performs a dual role; if a wing drops, the lower wing rises and also lifts the nose to guard against the development of a spiral dive, due to the lower wing's aerodynamic center being ahead of the CG.

Large positive stagger, along with lower wing dihedral only,

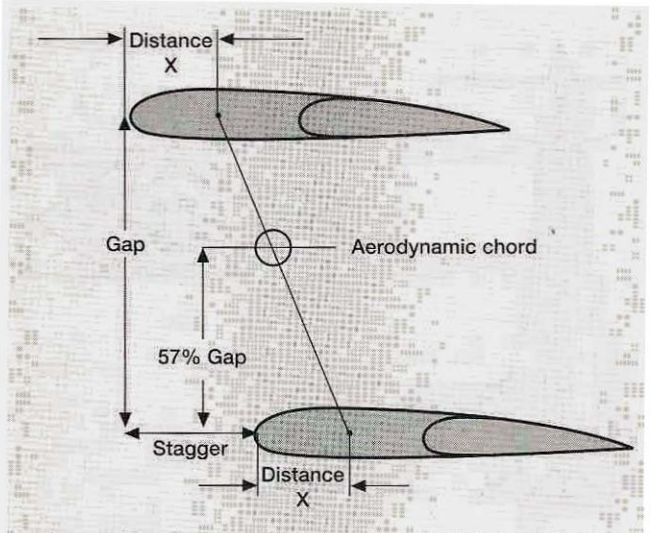


Figure 6. Aerodynamic center location (both wings swept back 10 degrees).

would have a similar action, but since the lower wing's aerodynamic center is behind the CG, a tendency for a shallow dive could develop.

For low stagger (positive or negative), this author suggests lower wing dihedral only.

WING SWEEPBACK

According to Hoerner's "Fluid Dynamic Lift," 2 to 3 degrees of sweepback are equivalent to 1 degree of dihedral in level flight but, unlike dihedral, the effect increases proportionally to the lift coefficient at higher angles of attack. Little or no dihedral is required for sweptback wings.

Sweepback aids directional stability. When yawed by rudder, the lift differential between advancing and retreating wings promotes rolling action. In biplanes, it is usual to have only the upper wing or both wings swept back—but not more than 10 degrees.

Locating the center of lift (or aerodynamic center) requires locating the MAC of the swept wing(s) and locating its (their) aerodynamic center(s) at 23 percent of the chord from the leading edge as in Figure 4, and determining distance "X."

Figure 5 for upper wing sweepback and Figure 6 for upper and lower sweepback are self-explanatory.

BIPLANE AIRFOILS

Because a biplane's wings are shorter and narrower than an equivalent monoplane wing of equal area and aspect ratio, the bending and torsion loads are reduced, particularly if the outboard N-struts are functional.

Thinner airfoils are suggested with thickness-to-chord ratios of 9 to 12 percent. Symmetrical airfoils have no pitching moment, but their maximum lift coefficients are low, and they suffer greater reduction in maximum lift coefficient and increased drag at low Reynolds numbers. Their landing speeds are higher.

Cambered airfoils are less affected by scale effect, have higher maximum lift coefficient and lower profile drag at low Reynolds numbers but have modest nose-down pitching moments. Their landing speeds are lower.

A compromise is the semisymmetrical airfoil, which has a higher maximum lift coefficient than a symmetrical airfoil and relatively low pitching moments.

This author favors Eppler airfoils, which were tested in the wind tunnel at Stuttgart University in Germany. Their airfoil plots are excellent, are at low Reynolds numbers and do include the airfoil's pitching moments—something that is not yet provided by similar testing at U.S. facilities. Suggested Eppler airfoils are:

E193—10.2 percent thick
E 205—10.5 percent thick
E222—10.2 percent thick
E226—10.9 percent thick

LEVEL FLIGHT ANGLE OF INCIDENCE

A biplane is no different than a monoplane, but two wings rather than one must be considered. It becomes complicated if decalage is used; each wing should be considered separately and the angle of incidence for each determined. As mentioned, the most efficient wings are of equal area, span and chord, set at the same angle of incidence and with or without stagger.

PITCHING MOMENTS

These nose-down moments are a consideration for airfoils with cambered mean lines and are overcome by a download on the horizontal tail. The narrower chords of biplane wings result in lower pitching moments than for an equivalent monoplane.

WAKE DOWNWASH

There is very little data available on wake and downwash for biplanes. This provokes the question of where—vertically—to position the horizontal tail. To have the tail immersed in the wake from either wing is not good design.

As Figure 7 illustrates, there are three possible vertical locations. Location 1 calls for a T-tail and is probably the best for horizontal tail effectiveness. Location 2 between the wakes is the usual position. It should be positioned at 1/3 of the space between the wakes and above the lower wake. As the wings' lift coefficients increase, as in a climb, the wakes' downwash angle will increase, but the tail will not be immersed in either wake. Location 3 is not practical since it would be below the fuselage.

I hope these articles have piqued your interest in biplane design and theory. Happy landings!

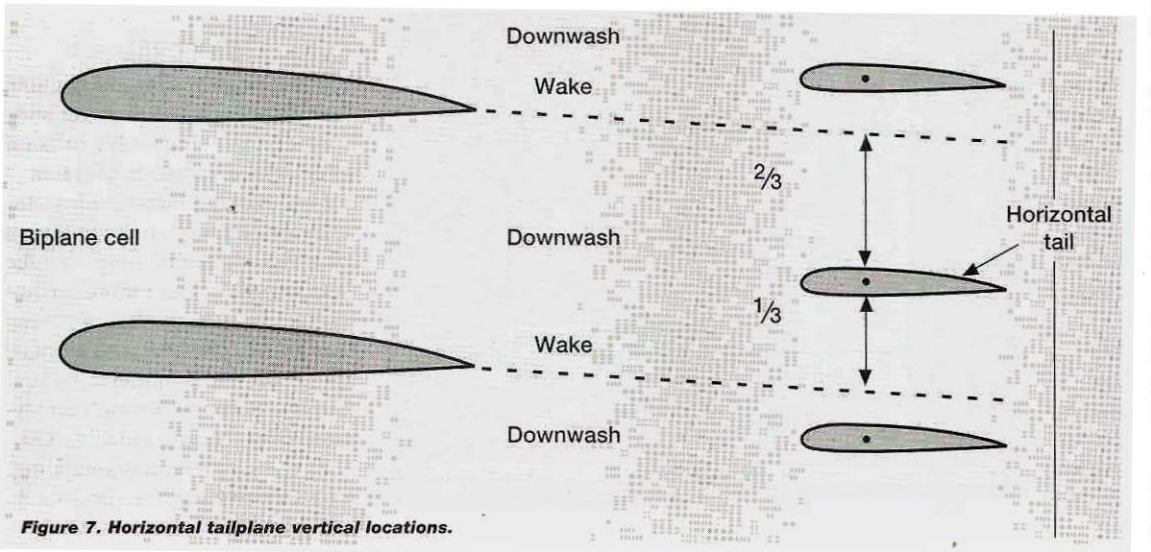
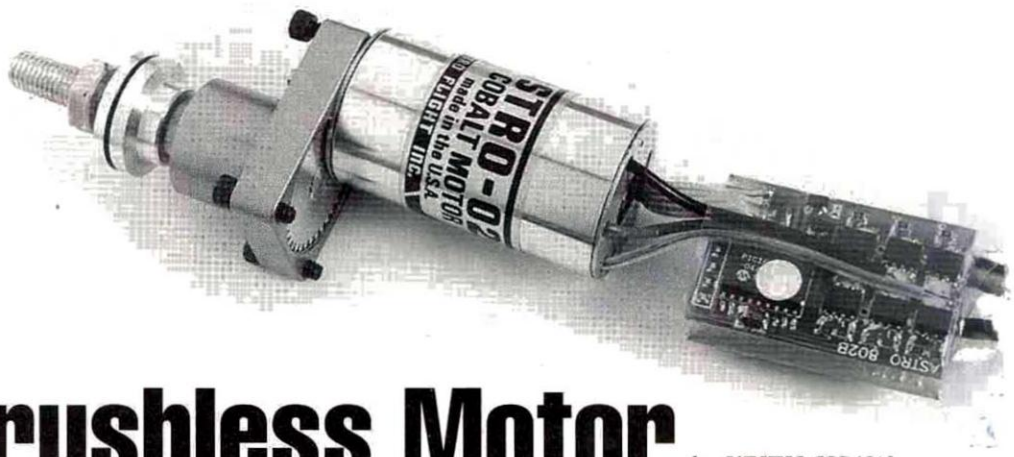


Figure 7. Horizontal tailplane vertical locations.

**Manufacturers are listed alphabetically in the Index of Manufacturers on page 118.*

MODEL AIRPLANE NEWS

PRODUCT REVIEW



PHOTOS BY WALTER SIDAS

AstroFlight

020 Brushless Motor

by KEITH SHAW

WHAT'S THIS? A review of a small motor written by the guy who's famous for trying to deplete the world's Ni-Cd supply? Well, if truth be told, I really like small airplanes. I have many fond memories of the dozens of ½A planes I designed and flew in the '60s and '70s. They had great performance, were inexpensive to build and easy to transport and store. Overall, they were the perfect solution for a college student. However, there are also less than pleasant memories of the gooey mess, shrieking noise and continuous mechanical failures of the powerplant.

Maintenance-free power and efficiency

There is currently (ouch!) a renewed worldwide interest in small aircraft, powered by little, inexpensive ferrite motors of the Speed 400-type. Except for some tiny, exotic pylon racers and a few multi-motor designs, though, the performances I've witnessed have been quite mediocre. Any attempt to extract higher power from these small ferrite motors dramatically shortens their life, sometimes down to less than a dozen flights! I find that the joy of flying electric aircraft is dampened if I need to fiddle constantly with a motor.

Bob Boucher of AstroFlight* is a very clever man who has always understood the attraction of small planes. Along with his line of larger motors, AstroFlight's brushed 05 and 035 cobalt motors have provided reliable, efficient power for several decades now, enabling thousands of people to enjoy trouble-free, small electric planes. About the only drawback to these motors was that they were a little heavier than appropriate for the really small planes in the ½A class.

THE NEW KID ON THE BLOCK

AstroFlight's newest motor, the brushless 020, is already revolutionizing the small-plane field. Even though it is smaller and lighter than the ubiquitous Speed 400, it is virtually maintenance free, much more efficient and more powerful by far. The motor is only 0.95 inch in diameter and 1.7 inches long and weighs a mere 2.3 ounces. It features dual ball bearings and a full ⅛-inch shaft, which is noticeably tougher than the 3/32 shaft common with other small motors. Since its design is brushless, a specially designed matching AstroFlight controller is required. It is about the size of a postage stamp, features *two* microprocessors and a BEC and is hard-wired to the motor to eliminate the weight and space of the connectors that would be required for the necessary eight connections (three power leads and five sensor leads). Two different windings are available: a 7 turn that's mostly for direct-drive applications and a hotter, 6-turn variant for pylon, ducted fan and gear reduction use. You can also choose from two controller options: the standard one is for use up to 15 or 16 amps and, for an additional $25, the enhanced version is for currents up to 25 amps. In addition to the direct-drive model, there are two geared versions available with either a classic offset spur design (3.3:1 ratio) or a more expensive coaxial planetary design (4.4:1 ratio).

SPECIFICATIONS

Product: 802 Brushless 020

Manufacturer: AstroFlight

Weight: 2.4 oz. (motor), 0.7 oz. (speed control)

Dimensions: 0.95x1.75 in. (speed control, 1.25x0.95x0.3 in.)

List price: $200 (motor with speed control)

Features: dual ball bearings; full ⅛-inch shaft; a two-microprocessor speed control hard-wired to the motor; six-FET control with BEC.

Hits
- Virtually maintenance free.
- Small and lightweight.
- Powerful and efficient.

Misses
- I didn't think the motor/speed control connection had enough support.

Brushless motor designs have many inherent advantages. Since there are no brushes to replace, there is no maintenance to perform. A nice bonus is the lack of brush dust that eventually contaminates an otherwise clean airplane. Brushless motors are much more efficient due to the lack of mechanical brush drag and electrical losses at the brush/commutator interface. Efficiency is also helped by better cooling, as the windings are in direct thermal contact with the outside of the motor case. Remember, heat is the enemy of any motor. A minor but important point is the almost total lack of generated RF noise that can play havoc with the radio link.

For those people who enjoy "virtual modeling" by playing with motor performance simulation programs, all the motor constants are available at the AstroFlight website at http://www.astroflight.com, along with a vast amount of other good info and links. I must stress that these programs are based on an *extremely* simple motor model. They do not include factors like copper heating, brush drag, interface losses, hysteresis, or circulating currents. My tests regularly show the brushless 020 performing much better than the programs predict, while the small brushed ferrites come out worse than expected.

During extensive testing on both prototype and production units, I was impressed with the power of this little motor. It can easily handle 100 watts with the standard controller and nearly 200 watts with the beefed-up 12-FET controller, while demonstrating efficiency of 80 percent

or better. On seven cells, the 7-turn standard motor will spin a Cox 6x3 or a Master Airscrew 5.5x4.5 at better than 16,000rpm. The 7-turn geared (3.31:1) motor can spin even larger 8x7 and 9x7 props (see chart). The little BearKitty I demonstrated at the 1997 KRC has a 6-turn motor with the 3.3:1 Astro gearbox, a standard controller and seven SR Magnum 1250 cells. It turns a 9x7 prop at about 7,500rpm, which gives the 24-ounce, 200-square-inch fighter almost unlimited vertical performance while regularly doing rigorous aerobatics for seven to eight minutes. The pylon setup (6T and enhanced controller) winds the CAM 4.7x4.7 prop at over 20,000rpm and turns the typical 65 to 70mph Speed 400 racer into a 120mph rocket. I have also witnessed stellar climb rates on converted hand-launch gliders equipped with the planetary geared 020 and a CAM 11x8 folding prop.

ASTROFLIGHT 020 BRUSHLESS MOTOR

7-turn, geared 3.31:1

	Current	Volts	Rpm
APC 8x7	8.7	8	6,800
	10.0	9	7,500
	11.9	10	8,200
APC 9x7	10.5	8	6,600
	11.8	9	7,200
	13.1	10	7,600
M. Airscrew 8x7	7.2	8	7,200
	8.6	9	8,000
	9.8	10	8,500
M. Airscrew 9x7	9.5	8	6,800
	11.0	9	7,300
	12.1	10	7,900
Zinger 9x7	12.0	8	6,200
	13.6	9	6,500
	16.2	10	7,200

WHAT ABOUT EFFICIENCY?

Judging the merits of a power system requires some careful thought. The first major point is efficiency, expressed as a percentage to quantify the amount of power really turning the prop compared to the electrical power being drawn from the battery pack. The input power is expressed in watts—the product of the battery voltage times the current drawn. So if a motor is 80 percent efficient, 80 watts of every 100 watts drawn from the pack turns the prop, while the remaining 20 watts ends up as generated heat. A higher-efficiency motor can turn a prop faster (or a bigger prop at the same rpm) than a lower-efficiency motor *at the same input power.* An example might be helpful. Most Speed 400-style motors are only about 50 percent efficient (although with careful break-in, timing advancement and prop selection, they may achieve 60 percent for a limited number of runs). For best longevity, the Speed 400 should stay below a maximum of 10 amps. The input power from a 7-cell pack is about 70 watts (assuming 1 volt/cell under load), but only 35 watts make it to the prop. An 80 percent motor such as the Astro brushless 020 would deliver 56 watts to the prop for the same 70W input. This is a 60-percent increase in real power for better aerobatics or higher climbs. Alternatively, one could reduce the throttle and get a 60 percent longer motor run at the same performance level as the 50-percent-efficient motor.

Another factor to consider is the maximum power limit. For the 020 and the standard controller, the upper current is about 15 to 16 amps. At an input power of around 110 watts and continuing the assumption of 80-percent efficiency (my tests have verified this), 88 watts arrive at the prop. This is now over two and a half times the power of the poor little ferrite! And if one elects the enhanced controller, we're talking about a potential of *four* times the power. Obviously, a higher-capacity battery pack would be necessary to maintain these higher currents for anything other than a sprint flight. But even with a small battery pack, you can fly at reduced throttle and tootle around the bean patch with all the other 400-size planes; you can enjoy a longer flight and still watch everyone's jaw drop whenever you pull the nose up, punch full throttle and go ballistic! This motor really can give you the best of both worlds: long flights and great performance.

LET'S GO FLY!

There are quite a few kits, plans and even a few ARFs designed for 400-class motors. The Astro brushless 020 would be a perfect upgrade for enhanced performance, but it might be wise to strengthen the wing a bit to handle the higher loads that will occur at the increased power levels.

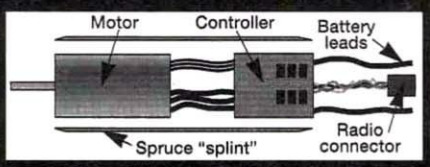
However, I think the real home for the 020 is in all the hundreds of ½A designs and kits still out there. Back when ½A was really popular, radios were still quite large and heavy; in fact, a receiver, two servos, 225mAh battery pack, TD .049, mount and 2-ounce fuel tank weighed *more* than the 020, controller, modern receiver, three tiny servos and seven 600AE cells! So this new electric system *increases* power and flight time and *decreases* weight, with a throttle and rudder control thrown in to boot! Add to that the ability to use a gearbox to drive a more reasonably sized propeller on a bulky or draggy fuselage, and you have the perfect answer to schoolyard scale and/or aerobatics. I can see hordes of little Extras, Chipmunks, Zlins, Sukhois, Mustangs, Corsairs, Cubs and Taylorcrafts frolicking now.

So what are you waiting for? Buy an Astro brushless 020 and join the fun. I know I have at least a dozen scale designs in mind for this great little motor!

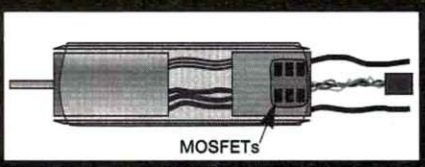
**Addresses are listed alphabetically in the Index of Manufacturers on page 118.*

A SUGGESTED IMPROVEMENT

Even the best products can benefit from suggestions. Although the controller is hard-wired to the motor, I do not think it is supported well enough. I make two "splints" out of ¼x⅛ spruce to support the controller. With a good contact cement such as Walther's Goo, they are glued to the side of the motor and the heat-shrink on the controller. Then the motor and controller are sleeved in heat-shrink tubing to clamp everything together, as in the included sketch. For high-current applications, I carefully cut off the heat-shrink over the MOSFET area of the controller to aid cooling.



Glue a ⅛ x ¼ spruce "splint" to the sides of the motor and controller with contact cement.



Heat-shrink tubing. Trim heat-shink away from MOSFET area of controller, if needed.

MODEL AIRPLANE NEWS
HOW TO

Make a Steerable Tailwheel

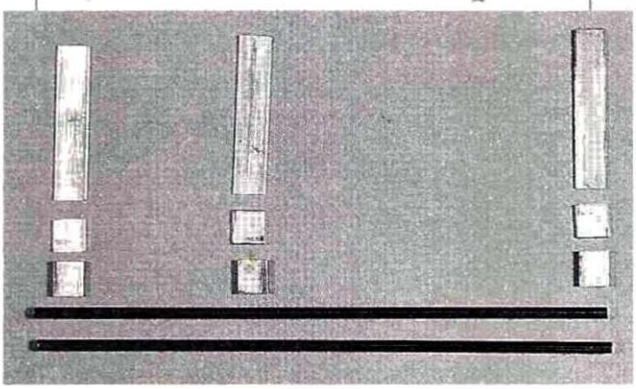
by RON BOZZONETTI

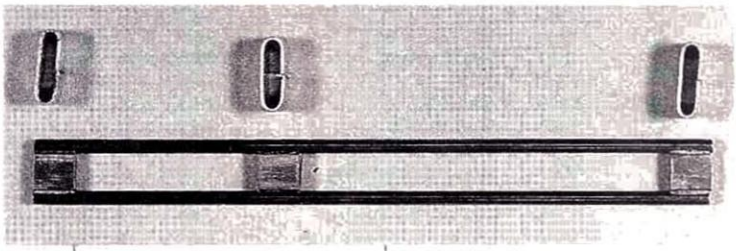
It's an easy custom fit!

USING BASIC TOOLS, it's easy to make a model tailwheel assembly out of music wire and 1/4-inch-wide brass strips. This tailwheel is also inexpensive and can be custom-made to fit any aircraft.

Here, I've described the process for making a tailwheel for a .60-size model, but you can make one for a .40-size model if you substitute 1/16-inch-diameter wire for the 3/32-inch shown.

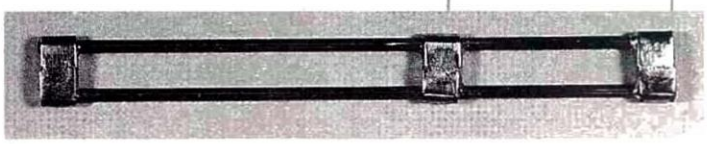
1 Two pieces of 3/32-inch diameter music wire are cut to suit your model (in this example, they are each 4 inches long). The pieces of 1/4-inch-square (0.062 and 0.032 inch thick) brass, cut off 1/4-inch-wide brass strips, are needed to achieve the same thickness as the 3/32-inch-diameter music wire. The longer piece of brass strip (0.016-inch thick) will be used to form a collar around the assembly.



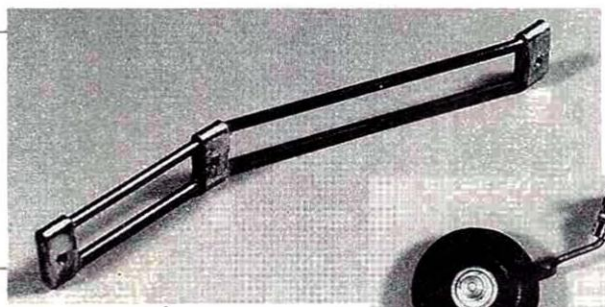


2 The 1/4-inch-square brass pieces have been silver-soldered between the 3/32-inch-diameter music wires. The thin brass strips have been formed into a collar to fit over this unit.

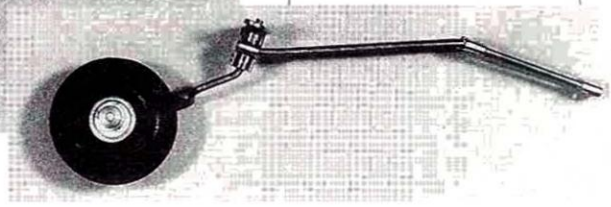
3 The formed brass collars have been silver-soldered over the 1/4-inch brass pieces.

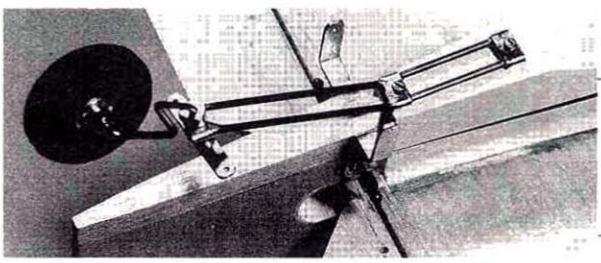


4 The unit shown in photo 3 has been placed in a vise and bent to the desired angles. Holes were drilled (prior to bending) to accept two hold-down screws and the tailwheel bracket.



5 The assembled tailwheel bracket ready to be mounted on an airplane.





6 The assembled unit attached to an airplane. A tiller arm was made from brass strip and silver-soldered onto a wheel hub. Springs, omitted from this photo, would be attached to the tiller arm and the brackets would then be attached to the rudder.

MODEL AIRPLANE NEWS

FIELD & BENCH REVIEW

Speed 400 composite missile

PHOTOS BY JIM RYAN

DIVERSITY MODEL PRODUCTS

SkaT

by JIM RYAN

AFTER YEARS OF popularity in Europe, Speed 400 pylon racing is catching on in the U.S. in a big way. Electrics flyers everywhere are attracted by the chance to join the "go fast and turn left" crowd with a minimal investment. With competitors limited to a stock $10 motor, piloting skills make the difference. And since the cost is so low, you don't break the bank if you roll your plane into a ball at turn 1.

From the moment I saw Diversity Model Aircraft's SkaT fly at the last KRC Electric Fly, I knew I had to have one. This little composite missile was clearly faster than any other S400 racer there and, at around $70, the price was right. As soon as I arrived home, I ordered one. The SkaT is available from electrics suppliers like New Creations R/C* and Northeast Sailplane Products*.

FLIGHT PERFORMANCE

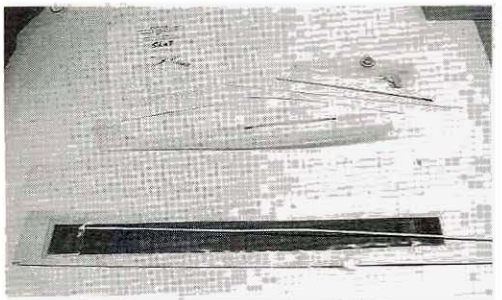
As with most racers, the controls are sensitive, and the recommended throws are ± 3/32 inch for ailerons and elevators. Also, the narrow wing chord makes for a sensitive CG. I had mine trimmed a bit nose-heavy for the first flight, and this made it harder to get airborne.

• *Takeoff and landing*

Because of the small wing area, I recommend you have a trusted assistant handle the launching until the plane has been properly trimmed out and you're thoroughly familiar with its handling characteristics. The SkaT needs some help to get going; throw it hard and slightly upward so that it crests about 10 feet up. From there, you can descend and let the speed build up. By my third flight, I was launching it myself with no problems.

The little racer accelerates all the way to the first turn, and by time it comes back, it's really making tracks. The nicest surprise is that it's not the least bit twitchy. After getting the CG properly positioned, I found the model stable and predictable, but you do need to pay attention, because it certainly covers some ground.

Landings take more room than you might expect for such a small model; because of the low profile drag, you need a long shallow approach. You might want to disable the brake on your speed control, since the windmilling prop will help scrub off speed. Just fly it down and hold it a foot or two off the ground until it settles in. With the straight wing, you have to

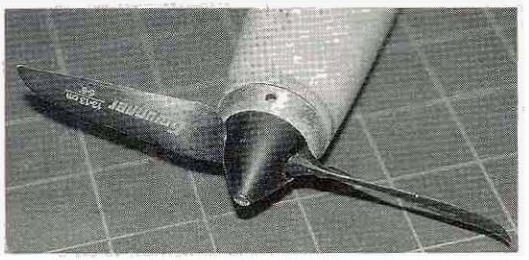


The SkaT kit is very complete, right down to the nylon screws and pushrods. Material quality is excellent throughout, and all parts are neatly packed.

PACKAGING AND PLANS

The SkaT comes neatly packed in a single small carton. It features a nice epoxy/glass fuse that is very light and incredibly skinny. I initially wondered where all the hardware would go. The wing-cores are cut from blue foam, and all of the hardware is included, right down to the nylon screws and pushrods.

The nicest surprise in this kit is the excellent instruction manual, which clearly details all stages of construction with professional line drawings. Because the model is largely prefabricated, there are no full-size plans.



The 1 3/16-inch Graupner racing spinner mates perfectly with the slender nose of the SkaT. The CAM Speed racing prop shown is the fastest prop around right now, but it breaks easily. I recommend a tougher prop or a folder for practice sessions.

FUSELAGE

The molded-glass fuselage appears to be made from a single ply of 4-ounce cloth, and it's very light. There were a couple of cracks in mine owing to the rough treatment it received in shipping, but these were easily repaired with thin CA and a couple of small glass-cloth patches. I washed the entire fuselage and canopy with soap and water to remove the PVA mold release. Then I lightly wet-sanded the parting seam and filled a few small pinholes with acrylic spot filler. The kit includes one of the handy laser-cut motor mounts that are marketed by Tim McDonough, and I used a simple fixture to hold the mount in the proper alignment while I CA'd it into place. Because of the importance of an accurate thrust line on a racer like this, I recommend you do this to ensure a straight flying model.

Next, I test-installed a motor and slipped the recommended Graupner* racing spinner onto the shaft with a piece of medium sandpaper sandwiched between the spinner and fuse. After turning the spinner back and forth a few times, I had a perfectly uniform gap in seconds.

After I had trimmed the wing saddle and installing the ply wing mounts and elevator pushrod housing, the fuse fabrication was essentially complete.

SPECIFICATIONS

Model name: SkaT

Type: Speed 400 pylon racer

Manufacturer: Diversity Model Aircraft

Wingspan: 28 to 32 in.

Wing area: 91 to 101 sq. in.

Weight: 14 oz.

Length: 22 in.

Wing loading: 19.4 to 22.2 oz./sq. ft.

Recommended power: 6V Speed 400 on 7 cells

Motor used: 6V Graupner Speed 400 with 7-500AR cells

No. of channels req'd: 3 (aileron, elevator and speed control)

Radio used: JR X783 with Hitec HS-80 microservos

Wing construction: foam reinforced with carbon fiber and sheeted with balsa

Fuselage construction: molded fiberglass

List price: $69.95

Features: molded-glass fuse, composite wing, complete hardware package and decal sheet.

Comments: the SkaT shows the excellent quality that can be obtained from some of the "cottage" suppliers serving electrics flyers. It's a high-performance model that can be built by any modeler of intermediate skills.

Hits
- High-quality glass work.
- Careful material selection.
- Excellent instruction manual.
- Awesome performance.

Misses
- Canopy arrangement is inconvenient.

hold it perfectly level to avoid dragging a wingtip, but it's a sturdy model, and if you do spin it around, you aren't likely to damage anything but your ego.

• *High-speed performance*

Going fast is the SkaT's whole reason for being, and it certainly delivers the goods. This is my third Speed 400 pylon racer, and it's by far the fastest. Better yet, it's crisp and predictable, and after a couple of flights, I felt ready to fly a tight pylon course. There's none of the suspect pitch stability I've seen in some other small pylon racers. I can't wait to try it out on the racecourse, but for now, I'll have to be content with practicing.

• *Low-speed performance*

Low speed is a relative thing. Even with the power pulled back, the SkaT is very quick. If you're hoping to throttle back until you get used to it, you're in for a challenge; this model just doesn't want to fly slow. Having said that, the SkaT is stable and easy to handle in the glide. With its tiny wing area, it will stall, but you just need to pay attention. I try to land before the BEC cuts in, as it won't glide for long.

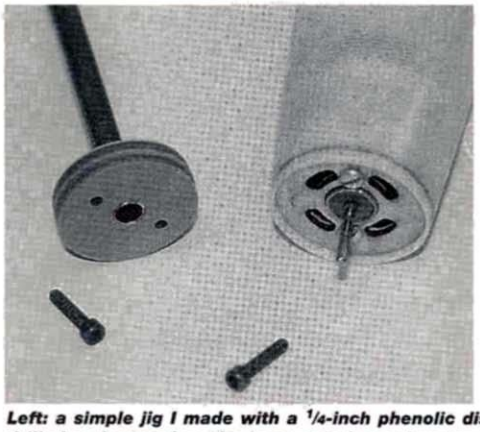
• *Aerobatics*

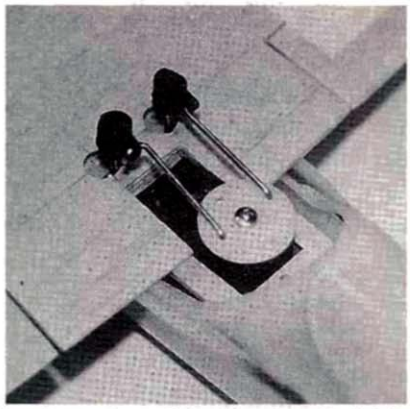
Other than its impressive speed on less than 50 watts at the prop, the thing about the SkaT that grabbed my attention at KRC was its aerobatic performance. With its light weight and efficient airframe, it has awesome vertical performance considering its modest direct-drive powerplant. Huge loops, vertical rolls, Cuban-8s and other maneuvers are no problem. If this plane doesn't make your clubmates sit up and take notice, you might want to check their pulses!

WING AND EMPENNAGE

The wing of the SkaT is the main secret to its blazing speed. Until now, the trend for S400 pylon racers has been toward relatively low aspect ratio (A/R) wings, but the SkaT has an extremely narrow wing with a high A/R of around 10:1.

The machine-cut, blue-foam wing-





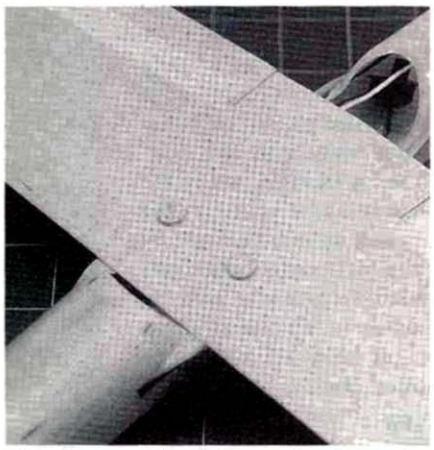
Left: a simple jig I made with a ¼-inch phenolic disk and some brass tube. The phenolic disk is drilled and tapped so the laser-cut plywood motor mount can be screwed to it. This assembly is then slipped inside the fuselage and aligned so the motor mount can be CA'd into place. Right: the aileron servo is mounted on the wing TE, and the torque rods are connected with short pushrods. It takes some work to get it right, but the result is a very tight linkage.

cores are nearly perfect, and they need only a very light sanding to remove the "angel hair" before they're sheeted. To assemble the wings, you laminate 2x24-inch strips of uni-directional carbon fiber onto the inside surfaces of the 1/32-inch balsa wing skins with laminating epoxy. You then add a strip of fiberglass cloth to further reinforce the center section. This makes for a *very* stiff wing, in spite of its thinness.

The instructions allow for laying up the skins and then sheeting the wings in two separate operations, which should help those who are unused to composite wings. In my case, I wetted out the uni-directional carbon fiber and glass and then laminated the wet skins directly onto the cores. Vacuum-bagging is helpful here, but not necessary.

After letting the wing cure overnight, trim the skins, taper the trailing edge and install the leading edge (LE) cap. You can trim the wings to whatever length you choose, from 32 inches down to 28 inches. I settled on 30 inches, figuring I can always shorten the wing at a later date.

The ailerons are cut from the wing and 3/32-inch aluminum torque tubes are glued to their LEs. This makes the thin ailerons torsionally rigid. Hinge tape is used to mount all control surfaces.



The wing-mounting holes are bored oversize through the top sheeting and foam-cores, and this socket is then filled in with epoxy and microballoons or Epoxolite. The hard plug is then drilled and countersunk for the mounting screws. This makes for a light but very strong mount.

The wing is bolted to the fuse with two nylon screws (which are countersunk so that *nothing* sticks out in the breeze). The wing bolt holes are bored out oversize (I recommend using a piece of sharpened 3/8-inch brass tube) and then filled in with epoxy and microballoons (I used Sig* Epoxolite) for reinforcement. After these plugs have cured, you drill and countersink them to accept the wing screws.

After mounting the wing to the fuse, you're ready to install the aileron servo and hook up the torque rods. The instructions give you a choice of mounting the aileron servo upright or on its side. Because space is at a premium, be careful with this step.

The wing/fuselage joint is faired over with a molded-fiberglass canopy that can either be permanently mounted on the wing or simply taped in place. While important for streamlining, the canopy arrangement isn't ideal. Taping it in place is inconvenient; if it were long enough to overlap the mating surfaces, it would be easier to position. To mount it permanently on the wing, you have to cut clearance holes for the wing-mounting screws. I elected to go with this option, knowing I could tape over the drag-inducing holes for races. This is a mild criticism; after all, the SkaT's number-one job is to go fast. Everything else takes a back seat to that.

The T-tail stab is 3/32-inch balsa sheet stock, which is mounted atop the molded vertical fin with two 4-40 nylon screws. This makes it possible to fit the disassembled SkaT into a very small case for travel. The elevator is hinged with tape, and the pushrod is mated to a small plywood control horn.

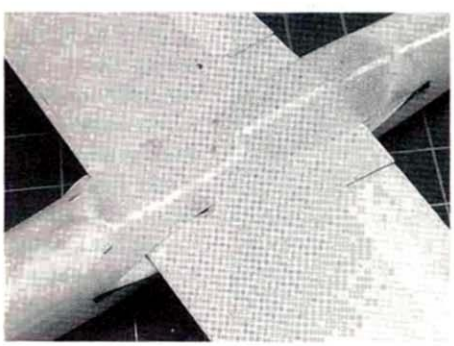
FINISHING

The instructions provide for painting the fuse and canopy and covering the wing and stab with film. To get the smoothest airframe possible, I decided to cover the flying surfaces with lightweight silkspan and nitrate dope filled with dope and talcum powder (see *Model Airplane News*, June 1998). I applied two light coats of paint and some color accents to aid in orientation.

Hardware installation was the only time-consuming aspect of building this model. There was just barely enough room behind the wing for my slimmest micro receiver and a microservo, and I substituted Gold Stecker 2mm connectors for my usual Anderson Powerpoles to save space. With all the hardware carefully shoehorned into place, it was time to go fly. The all-up weight of my fully painted version was 14.5 ounces.

SUMMARY

The SkaT is an outstanding value with dazzling performance. There are no difficult steps in the assembly process, and while very fast, it's quite stable in flight. Any pilot of intermediate skills should be able to open some eyes at the local field with this micro missile and, with sufficient skill and practice, be competitive on the pylon course.



With the wing mounted on the fuse, the fiberglass canopy is trimmed to fit. To simplify flight preparation, I glued the canopy to the wing. This requires cutting clearance holes for the wing screws, but these can be taped over for races.

**Addresses are listed alphabetically in the Index of Manufacturers on page 118.*

SR Giant Scale!

If you're into Giant Scale aircraft, we've just introduced some new battery packs specifically for you!

Our new ***1600 Series*** pack replaces our 1500 Series pack that so many of you have chosen as the standard for Giant Scale aircraft. In addition, we've also updated our 1800 Series pack replacing it with our new ***2000 Series*** pack.

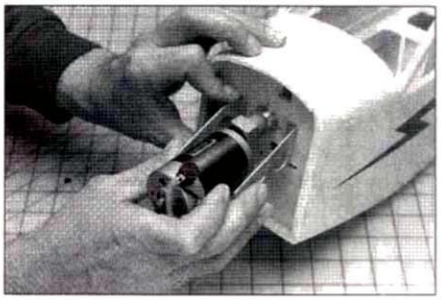
The exciting thing about these two packs is that they will give you much more flying time than a 1200mah pack yet they are no larger or heavier! *Both* the ***1600 Series*** and ***2000 Series*** packs weigh 7.4^{oz} and in a flat pack measures only 3.5" x 1.7" x .9" .

If what you really want is a 1200mah pack, no problem! We're also introducing our new ***1200 Series*** pack that only weighs 5.4^{oz} and in a flat pack measures only 3.5" x 1.4" x .9"! As you can see, it's much smaller and lighter yet it still gives you all the power you'll need for large aircraft with lots of servos.

In addition to our new packs, we've also added ***Volume R-7*** to the ***R/C Techniques*** library. Volume R-7 will tell you everything you ever wanted to know about the wiring of large scale aircraft. If you're not familiar with *R/C Techniques*, it's a bi-monthly publication we publish covering all phases of our R/C Hobby. We maintain a complete library of back issues so that you can catch up on anything you've missed. Here are the specific questions answered in *Volume R-7*:

- Why would you need a higher capacity battery pack?
- Why wouldn't you need a higher capacity battery pack?
- What size range is generally the best to use?
- Other than capacity, why else wouldn't you want to use a standard size battery pack on a Giant Scale aircraft?
- What does the internal impedance of the pack have to do with your pack choice?
- How low a voltage is too low?
- What charge rate should you use?
- Can you extend the charge time to make up for a charger that doesn't charge at a high enough rate?
- Why shouldn't you use a "peak detection" charger?
- Should you use a 4 or 5 cell pack?
- Why would you want to use a 5 cell pack?
- Why wouldn't you want to use a 5 cell pack?
- Why don't 5 cell packs give you more flying time?
- What wire size should you use?
- How should you extend the leads on a battery pack?
- What size wire should be used for servos?
- Which is more important, the battery pack lead or the servo leads? Why?
- Should you ever use an aileron extension to extend a battery pack lead?
- Is there a better type of system switch?
- Why should you only use "slide" switches?
- How can you use double switches?
- What cycler and ESV loads should be used on larger packs?
- Which battery backup systems are best?
- Do you really need one?
- How can I power the receiver from one pack and the servos from a second battery pack?
- What receiver modifications are necessary?
- What size pack should be used to power the receiver?
- What size pack should be used to power the servos?
- How shouldn't you power accessory items such as smoke pumps and ignition systems?

The best part is that ***Volume R-7*** of *R/C Techniques* is only $3 including postage! We'll even include a complete index to both the *R/C Techniques* library and the *Electric Flight Techniques* library at no extra cost!



By the way, ***Volume E-14*** of *Electric Flight Techniques* gives you complete instructions and plans for converting the Hangar 9 Giant Scale Cub from gas to electric power!

Call us if you have any questions or to place an order. You can reach us at SR Batteries, Inc., Box 287, Bellport, New York 11713. Our phone is 516-286-0079 and our fax is 516-286-0901. Our Email address is 74167.751@compuserve.com .

-ADVERTISEMENT-

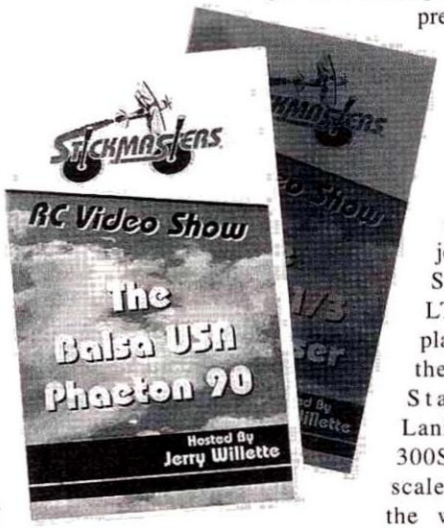
MODEL AIRPLANE NEWS

PRODUCT REVIEW

Stickmasters & Aerotow '97 Videos

by GREG GIMLICK

STICKMASTERS* VIDEOS ARE R/C shows hosted by Jerry Willette, who highlights one particular model on each video. The ads bill them as "reviews of airplanes and related products," along with building techniques, flying and workshops, and this is a pretty good representation of what you get. Each tape costs $19.95 and runs for about an hour, providing you an overview of the kit contents and anything Jerry sees as a stumbling block or challenge along the way. You won't get a step-by-step lesson on how to build a plane in these videos, but the host does come across as a "regular guy" and not a polished ad man, so you feel like he's talking to you as one modeler to another ... and he is.



The latest video from Stickmasters is by far the best of the ones I've seen and features the Balsa USA Phaeton 90. Jerry is clearly more comfortable in front of the camera than he was in his earlier videos, and his presentation flows more smoothly. There are lots of tips on how to do certain steps, like setting up the biplane wings and routing cables properly so they won't chafe or interfere with each other. An earlier video of the Lanier 1/3-scale Laser 200 discusses various tailwheel options and provides some great tips on running fuel and smoke-system lines. Perhaps one of the best features of these videos is the candid remarks and unrehearsed flights that are shown as part of the field test for each plane. On the Laser video, Jerry actually shows a dead-stick he encountered on the test flight, instead of editing out this "challenge" we all encounter at some time.

It would be nice if the info for each video gave you an idea of the shop tips it features and whether there is "bonus video" added. The Phaeton video has some great footage of the Balsa USA Northstar, but you don't know it's there until you watch the whole tape and find it at the end; it would have been worth noting as a feature. Overall, these tapes have developed into a nice presentation of techniques and plane test flights. Future tapes will cover some smaller projects, like the Sig Kadet LT-40, but big planes such as the Aerocraft Staudacher, Lanier Extra 300S and a 1/3-scale Cub are in the works, too. They're not a bad way to spend an hour, and I suspect they'll get even better as Jerry continues. Oh, yeah; you won't get dizzy from all sorts of special effects and loud music, either; these videos are just plain old modeling.

When I ask myself, "Was it worth the money?," I have to say "Yes," and that's not necessarily the case with Stickmasters' first videos. If you're thinking of building one of the planes Jerry covers, the video might be a good thing to watch before you buy; if you're not thinking about buying a kit, Jerry is still fun to watch, and you'll pick up a few tips along the way.

AEROTOW '97 ELMIRA

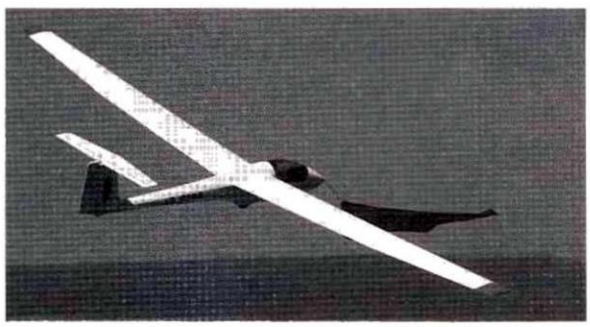
If you picture a stereotypical 2-meter polyhedral model when you think about sailplanes and soaring, this video will be a big surprise and a real treat, too. Aerotowing is a rapidly growing aspect of our hobby, and the folks at Harris Hill in Elmira, NY (home of the National Soaring Museum), are the hosts of this premier soaring event.

The video from Aerotow Elmira* is a very polished and professionally produced production that treats you to an hour's worth of towing, soaring, interviews, history, aerobatics and relaxation. The sailplanes range from 2-meter types all the way up to the 5.33-meter Duo Discus by EMS of Germany. The towplanes cover the spectrum from common Telemasters and Spacewalkers to the more exotic Pilatus Porters and Wilgas. A nice touch would have been a brief explanation of the equipment requirements and techniques for this type of event, as this video will definitely pique your interest.

During the interviews that are scattered throughout the video, we get to meet the German contingent representing EMS, along with many of the participants from around the U.S. and Canada. As an electrics flyer, I was excited when I saw the title, "Electric Tow Demo" by Icare Sailplanes; unfortunately, no information was given, and we only get to watch a brief launch and flight, which left me hungry for details. The segment showing the airborne video taken with PlaneTalk video equipment was very impressive and gave a great view from the cockpit of a sailplane launch and landing, along with a bit of aerobatics.

We're also treated to a brief visit to the Soaring Museum and a segment of old film showing the soaring activities that took place at Harris Hill in the 1930s. If anything is lacking in this video, it is information about the equipment being used—as a modeler, something I like to see. The video is a beautiful production with well-orchestrated music and clean editing, but there are times I found the special effects and music distracting.

At $24.95, this video is still a good buy and didn't "feel" expensive for its length and the amount of information provided; that's the litmus test for me. Aerotow '97 Elmira is pure entertainment set to music and will make you want to try aerotowing—guaranteed.



The popularity of aerotowing was evident at Elmira '97 Aerotow.

**Addresses are listed alphabetically in the Index of Manufacturers on page 118.*

by LARRY MARSHALL

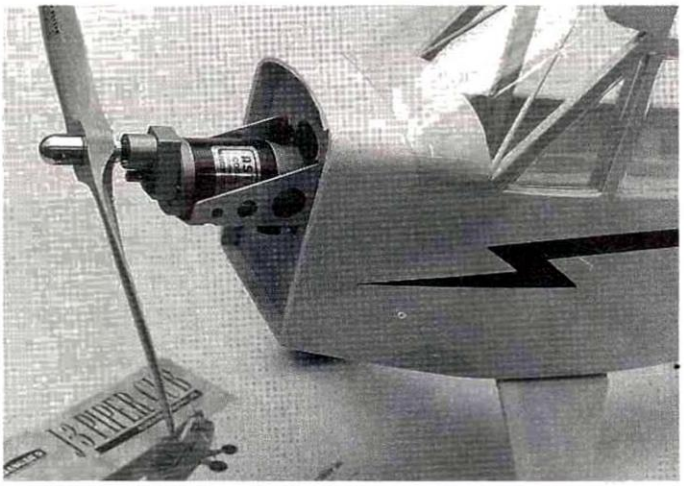
SELECTING A MOTOR

IN THE PAST TWO columns, I've discussed the process of matching an electric power system to an airframe without resorting to arithmetic. This has been difficult, but I think somewhat successful, judging by the mail I've received. As promised, this time, we'll talk about motor selection. Before doing so, I'd like to recap our example—a Hangar 9* Cub—so we're all up to speed with the aircraft parameters and the performance requirements of our power system that we need to make us happy campers when we fly this plane as an electric model.

Our Hangar 9 Cub has an 80-inch wingspan, 960 square inches of wing area and an airframe and radio weight of 5 pounds. For the sake of discussion, we targeted a flying weight of 9 pounds and determined that to fly it satisfactorily, we needed to spin a 13x8 or 14x8 prop at 6,000 to 7,000 rpm. To obtain this sort of propeller performance, we determined that we would need to put 590 watts into a ferrite motor, 540 watts into a cobalt motor, or about 500 watts into a brushless motor. If you don't recall how we did this, I encourage you to read my March and May 1997 "Current Thoughts" columns.

At this point, we must make a decision. Early on, I suggested that we could get watts by using a combination of high currents and low voltages or high voltages and lower currents. The tradeoff here is one of weight versus duration, as we get volts by adding cells, which add weight.

For the sake of our discussion here, let's assume we want to use a cobalt motor, and our target is 540 watts. If we run our motor at 54 amps, we need only 10 cells (20 ounces) to fly the plane the way we want, presuming we choose the right motor to permit this. Unfortunately, at 54 amps, we'll only get a couple of minutes of flight time from typical Ni-Cds. Thus, this sort of solution is only used for aircraft such as high-performance sailplanes, for which only short motor bursts are required to take the plane to altitude. For sport flying, we need to keep the currents reasonable so we can have a satisfyingly long flight. When setting up an electric airplane for sport flying, most people will target 25 to 30 amps as their full-throttle, static current draw. From 2000mAh cells (120 amp-minutes), this provides four to five minutes of full-throttle performance, and typical throttle management will move flight duration to six or seven minutes. When throttled back to Piper Cub performance, you often get as much as 10 minutes of flying. So that's how we'll set up our Cub.



Astro 40G mounted to the nose of a Hangar 9 Cub.

To determine the number of cells required, we need to talk a bit about the voltage you can expect to get from a Ni-Cd cell. All of them are nominally rated at 1.2 volts, but under high current loads, they will not provide that voltage. What we typically do, because it's easy, is to assume that we'll get 1 volt per cell. This may not be absolutely precise, but it's close enough for our purposes. So, to get 540 watts at 30 amps, we need to attach 540÷30 = 18 cells to our motor. At 25 amps, we'd need 540÷25 = 21.6. So a system with 18 to 21 cells and drawing 25 to 30 amps will fly our airplane just fine. We can add this cell-count range to our parameters list.

We need to check one thing, however. We assumed that our power system would weigh about 4 pounds. Does it? Twenty-one cells weigh 42 ounces, or 2.6 pounds. That gives us 1.4 pounds of leeway for the motor, controller and mount. Sounds pretty good to me, but we'll have to keep that in mind when we make motor choices.

At this point, we're well on our way to knowing exactly what we need to fly the plane. We need a cobalt motor that can handle 18 to 21 cells and, when it's loaded with a 13x8 prop, it will draw somewhere around 25 to 30 amps.

CHOOSING A MOTOR WITHOUT MATH

Here's where the going gets tough for the non-mathematician. But before we get into choosing a motor, let me ask you a question. How many glow flyers know anything about the torque curves of their engines? If you asked them, "Should you prop at the peak horsepower or the peak torque part of the power band?," would they know the answer? A hint might be to head to the flying field and watch guys try to squeak the last rpm they can out of their engines. The number of guys running too small a prop in an attempt to get more rpm is another indicator of the lack of understanding of such things as torque, rpm, power and thrust.

Why is this pertinent to our conversation? Well, I think it's relevant because while most people using glow engines don't really understand them, they are having a lot of fun. These modelers rely upon other people to help them with their engine selection.

This photo shows the nose of Tom Cimato's Cub. He uses a MaxCim motor and gearbox for the power. Note the controller below the motor and the hole he has cut for battery cooling (battery is deeper in the fuselage).

They often rely upon other people to help them set up their engines properly. In spite of this, their airplanes fly, and nobody looks down on them for asking advice.

So it should be with electric flight. To understand electric motors and to properly select one—independent of advice from manufacturers and/or fellow modelers—requires knowledge of their operation that goes well beyond knowing how to turn them on. As with glow engines, you must come to understand the differences between motors and how each responds to different conditions. Without learning this stuff, a glow guy will prop a 4-stroke the same way as his 2-stroke, and an electrics flyer will struggle with all the numbers associated with the various motors and the high degree of flexibility that each one provides. Without help, both will be disappointed. But if the electrics guy emulates the behavior of the glow guy and simply asks for help, he can be happy, too.

So what do you do to select a motor? Talk with someone who knows; it's that simple. At this point, you're armed with the knowledge that you need an 18- to 21-cell motor that will draw 25 to 30 amps when spinning a 13x8 or 14x8 prop. If you were to call any of the folks who sell electric motors, they would be ready and willing to tell you what they have in their motor line that will fit that bill. For instance, Larry Sribnick of SR Batteries* looked at the Hangar 9 Cub, just as we have. He did so with an eye toward writing an "SR Techniques" booklet on converting an ARF to electric power. As we did, he determined that he wanted 18 to 21 cells, and his booklet explains how to install an AstroFlight Cobalt 40G (G means that it's geared) and 21 cells to make it fly well. Tom Cimato of MaxCim Motors* wanted to fly a Hangar 9 Cub using one of his company's brushless motors. He used 20 cells and one of his MaxNEO-13Y motors with a 3.3:1 gearbox and 20 cells. He spins a 14x8 prop, and the plane becomes fully aerobatic with this combination. My guess is, if you were to call Aveox*, they might recommend one of their 1409/3Y motors with a gearbox. Hobby Lobby* might recommend one of their Mega motors.

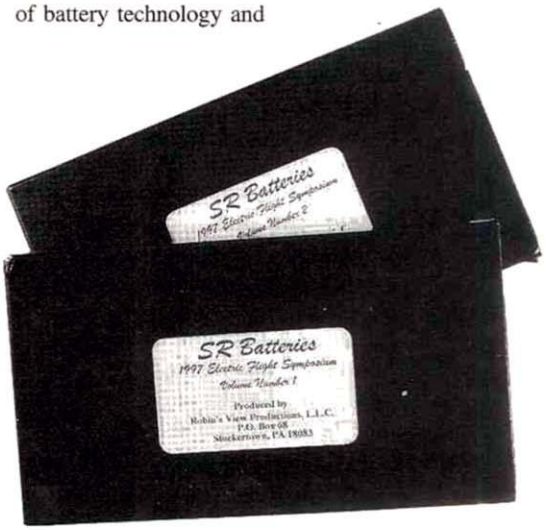
Another thing you can do is buy E-Calc. This is a Windows-compatible program that many of the motor companies are now using to provide the advice I've talked about above. For the princely sum of $30, you can do it yourself. Sid Kauffman of SLK Electronics* has done us all a big service by producing an easy to use program with a vast library of motor systems, so that we can punch in the numbers we've come up with for our Cub and then start sticking different motors into the mix to see the results. You can buy the program from Aveox, Hobby Lobby, MaxCim Motors, New Creations R/C* and SR Batteries.

So I guess the bottom line of this "no-math power system series" is that you shouldn't let knowledge (or lack of it) get in your way of having fun in electrics. There are more and more electrics flyers around who can help you. If there are none in your area, there are a number of companies, some mentioned here, that can help you select a proper power system. I hope that I've shown you how to select most of the components, leaving you with basic parameters with which you can ask good questions of motor manufacturers.

Next time, I'll start talking about the basics of electric motors that you'll need to know if you're going to make choices yourself and enjoy the flexibility of motors you already own.

SR SYMPOSIUM VIDEOS

I was at the WRAM show recently, and Bob Hunt of Robin's View Videos* and Larry Sribnick of SR Batteries handed me a couple of videos. These videos cover portions of the SR Batteries symposium that's held every year at KRC. The first one is a solid hour of Larry Sribnick's discussion of battery technology and



the use of nickel-cadmium batteries as power sources for electric airplanes and to power our radio gear. Larry does a great job of relating to the audience and answering most of the questions guys have about Ni-Cds. If you use Ni-Cds, this video is a good purchase.

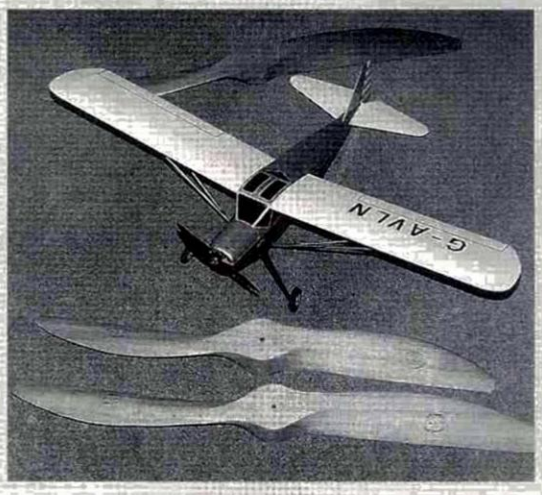
The second video shows a segment

ELECTRICS IN ANY SIZE

I got a letter from Jerry Smartt the other day. Jerry is a long-time electrics modeler who has done very well in electric duration competitions over the years. He sent me this photo, and I just had to share it with you, as it provides a couple of examples of electric power systems and the planes flown with them.

The plane in the photo is an Auster Arrow by Dave Andrews of Great Britain. It has a 41-inch wingspan and weighs 25 ounces. Dave powers it with 7-600AA Ni-Cds and spins an 8x4 to provide the thrust. Unfortunately, I don't know which motor is involved, but my guess would be a Graupner Speed 400.

The propellers in the photo are 40x30 props for Jerry's 52 percent Sopwith Tabloid. When completed, the plane will span 13 feet (9,500 square inches) and will use two 36-1900mAh power packs in parallel. (Jerry has a lot of experience flying smaller packs in parallel in his duration work.) Running these packs in parallel will let him drive a large motor longer (at the cost of twice the weight), but there are risks associated with running Ni-Cd batteries in parallel, so I don't advise anyone to do this without considerable experience.



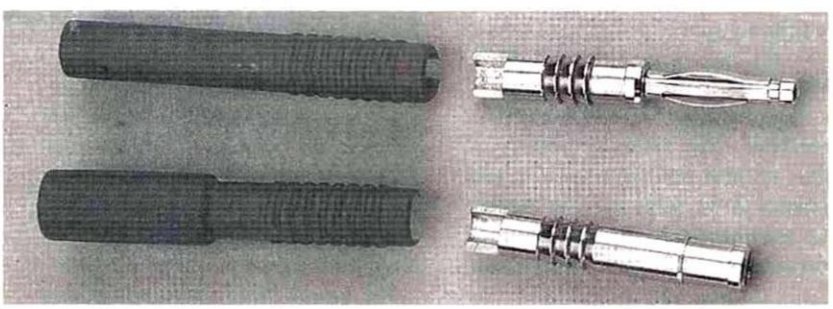
by Bob Hunt, who talks about building light by forming curved sheetwood pieces for models. Specifically, he goes through the process of producing a one-piece turtle deck for a model, and the technique looks great for keeping our electric airframes light. The second part of this video is the Bob Boucher show. Bob is not only the father of electric R/C and a brilliant engineer, but he's also quite a showman. Tim Allen has no better timing than Bob when it comes to telling humorous stories, and we're treated to some incredible tales about the early days of electric flight. His historical insights into some of the early military projects that he and his brother worked on really give you a good perspective on how lucky we are to have so much good equipment available to us. Each video sells for $19.95 plus $3.50 shipping, whether you buy one or both.

POWER AND LINKAGE CONNECTORS

I just have to show you a couple of things that Jim Martin showed me at Toledo. The first are small, gold-plated connectors that come with thin plastic

sheaths to protect against shorts when they're not connected. Those of us who fly Speed 400 planes have coveted—and sometimes obtained—these little connectors from their European source. Well, the source problem has been solved, as you can now get them from Hobby Lobby.

Sometimes, simple is elegant, and that's the case with the new Z-bends from Hobby Lobby. Z-bends are a very light way of attaching pushrods to servo and control arms, but they are tough to bend to exactly the right length. It's also the case that the wire is generally either too small or too large in diameter, so you either end up with slop in the connection, or the need to drill out the servo arms. These little connectors solve all these problems. They are machined to the exact diameter of a servo-arm hole and are soldered to the pushrod. Thus, you get the pushrod and Z-bend hooked up in the airplane, hit it with a soldering iron, and you've got a Z-bend right where you need it. Used on both ends of a pushrod, they should be ideal for the small planes that are now so popular.



ASTRO 217D

We've been blessed with a number of really nice micro-controllers because of the popularity of Speed 400 motors.

But these controllers typically can't handle much current. AstroFlight* has just released a small controller that can. Labeled the 217D, this is a microprocessor-controlled, high-rate controller that can handle 30 amps and up to 25 volts. As is the case with all of AstroFlight's higher current controllers, it does not have BEC which, in my opinion, would be inappropriate.

Addresses are listed alphabetically in the Index of Manufacturers on page 118.

Air POWER

by CHRIS CHIANELLI

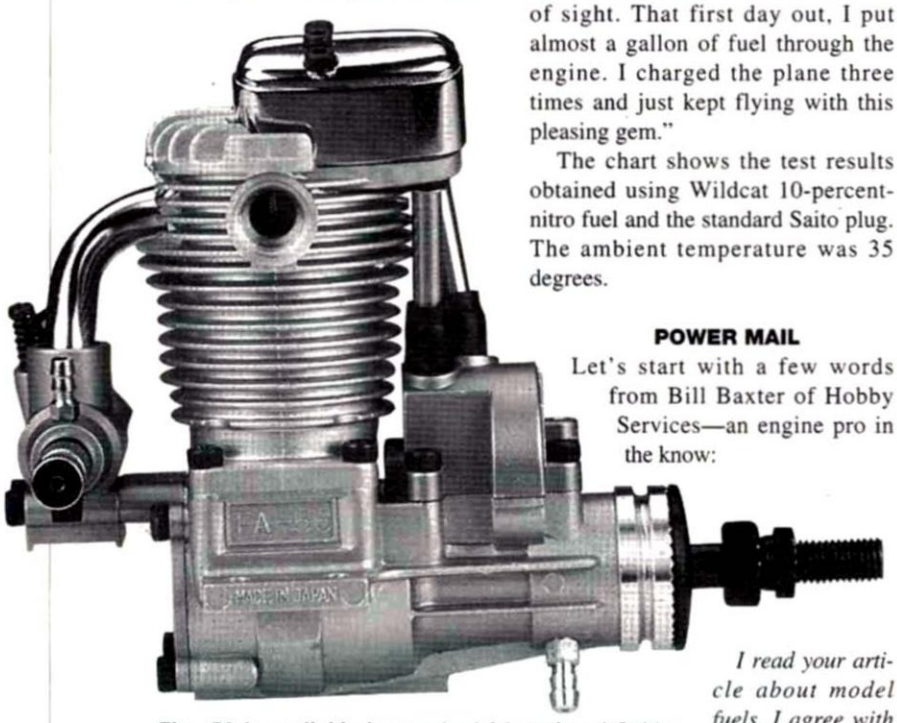
SAITO .56

I thought I'd start off this month's column with one of my favorite, all-around sport 4-stroke engines—Saito's* .56 single. Like all the other Saito single-cylinder engines, the .56 has an extremely reliable idle and excellent throttle transition. Among the features I like are: AAC (aluminum piston, with compression ring, running in a chrome-plated aluminum sleeve); and a simple, reliable twin-needle carburetor and single-piece cylinder/head assembly with turbulated, hemispherical combustion chamber. What I like most about the .56 is that it will fit into many .40-size models, weighs 15.5 ounces and swings an 11x8 prop at more than 10,000rpm and—even better—a 13x6 at over 8,000rpm! This is an engine worth writing about.

Over the years, Saito has tenaciously worked solely on 4-stroke engines, and the result today is a line that is associated with high-quality workmanship and dependable power.

As my longtime friend and "Air Power" associate Vic Olivett put it, "This little Saito turned out to be a reliable powerhouse. It would take my .40- to .46-size Stik vertically out of sight. That first day out, I put almost a gallon of fuel through the engine. I charged the plane three times and just kept flying with this pleasing gem."

The chart shows the test results obtained using Wildcat 10-percent-nitro fuel and the standard Saito plug. The ambient temperature was 35 degrees.



The .56 is available in standard (shown) and Golden Knight glossy black and gold-plate finish. Both versions are internally identical. Note Saito's use of the forward crankcase-breather position. This location gives superior crankshaft-bearing lubrication.

Prop	Idle rpm	High rpm	Thrust
10x6	2,940	12,200	–
10x7	2,810	11,900	–
11x6	2,620	11,200	5 lb., 8 oz.
11x7	2,440	10,620	6 lb., 3 oz.
11x8	2,420	10,060	6 lb., 4 oz.
12x6	2,120	9,640	5 lb., 7 oz.
13x6	2,080	8,160	5 lb., 1 oz.

POWER MAIL

Let's start with a few words from Bill Baxter of Hobby Services—an engine pro in the know:

I read your article about model fuels. I agree with your sentiments, but we both know that some of the fuel manufacturers will keep their mixtures "secret," even though the formula is only Klotz, castor, methanol and nitro!

The hard part about blending fuel is keeping the methanol in an anhydrous condition and keeping everything else as clean as a whistle and uncontaminated. That's what takes the money. Ah, well, read ya soon!

Thanks; words of wisdom from a pro who deals with engines for a living are worth their weight for sure.

SAME NAME; DIFFERENT ENGINE

Ralph Brehmer emailed:

Enjoyed your article in the October 1997 issue. I have a collection of 15 to 20 steam engines collected at flea markets over the years, and I'm looking at three of them on the shelf next to me. One is cast iron in a walking beam configuration. But the real reason for this note is to ask about the Magnum 65 GP SE I acquired for $70 new, never run, without box or info on it. The seller bought it years ago, he said, for well over $100 and never used or even started it. The engine is complete with the biggest muffler I've ever seen, a prop and spinner.

Magnums seem to get very mixed reviews from my flying buddies. What do you think?

Note this is a .65, and current Magnum ads do not include 65s. It's stamped "Made in Taiwan."

I built my first model in around 1940 and grew up in the hobby. I have a Sig Four Star 60 and think it would be fun to match it with the .65. Would it be worthwhile?

- *Which fuel was recommended?*
- *Which props for break-in and running?*
- *What kind of break-in?*

Until a few years back, Magnums were made by Thunder Tiger. Those are the ones stamped, "Made in Taiwan." Currently, Magnums are stamped "Made in China" and are produced by a different manufacturer, probably on mainland China.

If your Taiwan Magnum engine was never used or disassembled, it should serve you very well. A few guys in a club I fly with have the .65

and really do like it. Since this engine was made by Thunder Tiger, I would stick to their recommendation of a fuel containing no less than 18 percent lubricant and 5 to 15 percent nitro.

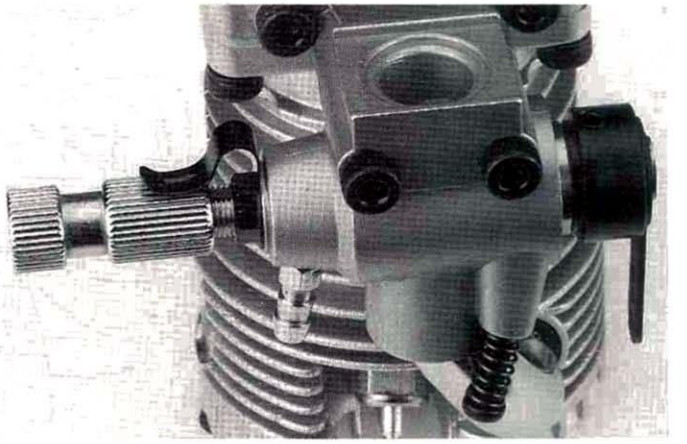
For static break-in, I would initially use an 11x6 to keep the load at a minimum. As long as it delivers sufficient thrust to fly the model safely, this is also a good prop to start with if you do the break-in in the air. This engine has ABC-type piston/sleeve technology with nickel plating instead of chrome, and it shouldn't require a whole lot of break-in. After four or five tanks (10 to 12 ounces) have been run through it on a cool, dry day, your .65 should be ready for full service on an 11x7, an 11x8 (APC), or a 12x6 prop (depending on airframe drag). Have fun.

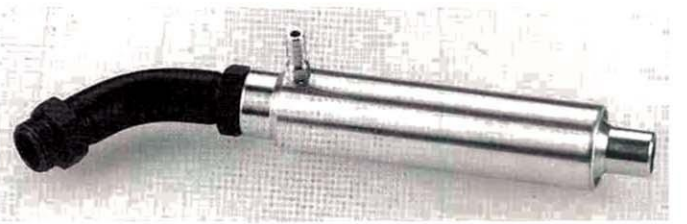
IN THE PITS WITH THE PITTS

Greg Brown of Grafton, VA, has this to say:

Thank you so much for your interesting article on engine performance (May issue, "Turning it Upside-Down?"). I have been following all engine-related articles closely and have learned a great deal of valuable information. One area I would like to know more about, though, is non-stock muffler performance.

Specifically, I have been trying to solve a performance problem I have with an under-cowl, Pitts-style muffler attached to several .61 engines, the latest of which is a Thunder Tiger Pro .61 ABC. For some reason obviously beyond my ability to solve, the engine will not accelerate smoothly through mid-range or will not maintain peak rpm without leaning out. It seems that if I set up the idle needle so that the engine doesn't lean out at vertical or extended full-throttle runs, the results are that it's too rich through the mid-range, and I get poor acceleration and throttle response. I have tried several solutions—stop up one of the exhaust ports, attach a pressure fitting, raise the tank to carb level and set the needle valves to factory settings—none of which worked. Do you have any advice?



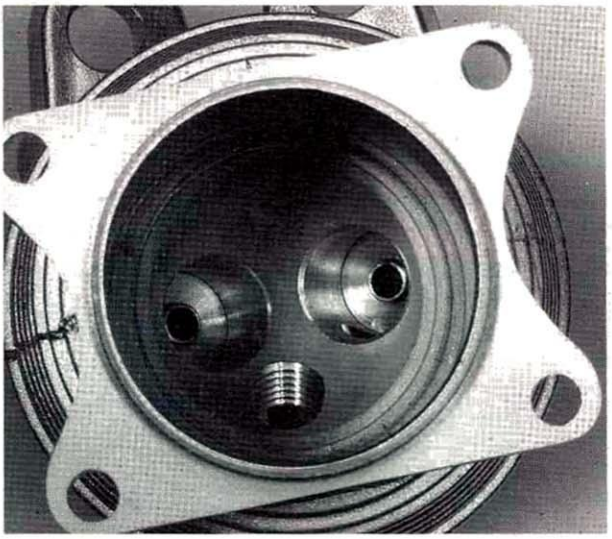


Saito retains the simple and proven 2-needle carburetor. What's new is the omission of the manual choke—an item I've not only found unnecessary on any 4-stroke, but also one that can easily cause flooding and hydra-lock if used carelessly. Below: stock muffler.

Over the years, I've used Pitts-style mufflers on many round-cowl scale model without any problems. That you had a problem on several engines—all with good piston/sleeve fits, I assume—narrows it down to possible fuel-draw problems. Investigate these things, Greg:

- Are you using fuel tubing big enough for a .65 engine?
- If the plane was designed for an upright engine, the tank should be moved down so that it's in line with the carburetor's spraybar. The tank's centerline should be about 3/16 to 1/4 inch below the spraybar orifice.
- Do you have a filter-type tank clunk? These things can get quickly clogged and cause serious fuel-draw problems. Get rid of it and put a standard clunk in. You should be filtering your fuel as it's pumped into the tank and, if you so desire, have an external, in-line filter on the fuel-delivery line that can easily be inspected and cleaned.

**Addresses are listed alphabetically in the Index of Manufacturers on page 118.*

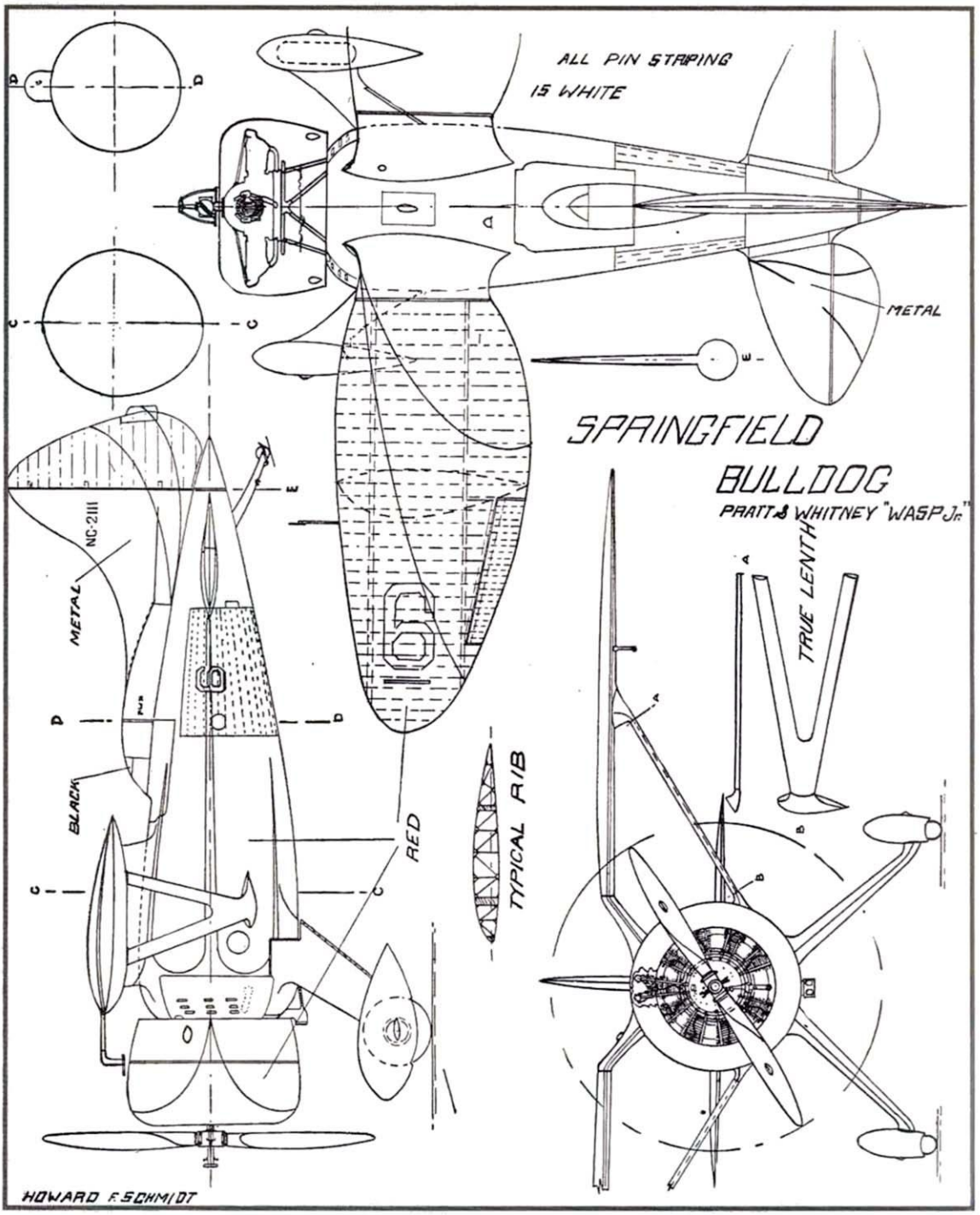


For whatever reason, some think cost cutting is what motivated the development of Saito's single-piece head/cylinder assembly design. Nothing could be further from the truth. The historic—and awesomely powerful for its size—Offenhauser racing engine was made in this fashion. Its advantages: superior heat transfer/dissipation; more uniform combustion-chamber cooling; and no head-bolt bosses (leaves more room and more machining latitude for larger, high-performance intake and exhaust poppet-valve porting). Obviously, machining features such as valve seats in a one-piece head/cylinder is more difficult and more expensive than doing so in a more conventional bolt-on head format.

Planes Worth Modeling

3-View Documentation for Scale Modelers

Springfield Bulldog



SPECIFICATIONS

Wingspan:
26 ft.

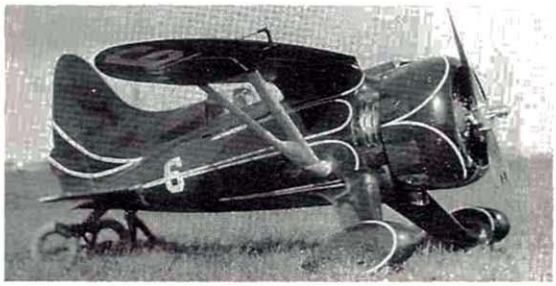
Length:
19 ft.

Wing loading:
39.6 pounds per square foot

Engine:
Pratt & Whitney Wasp Jr. 300hp

"If beauty alone were the proper ingredient for victory at the 1932 Cleveland Air Races, the Springfield Bulldog should have won everything in sight." Unfortunately for Robert Hall, the plane's pilot and designer, this red and black speedster was plagued with poor engine performance and finished a disappointing sixth in that year's Thompson Trophy race.

Hall had recently left the employment of the Granville Brothers to found Springfield Aircraft Inc., and he had hoped that the Bulldog's gull wings, controllable pitch propeller and intricate exhaust system would take it to the winners' circle; when the Bulldog didn't meet his expectations, he dismantled it and sold the parts. Whether the plane was given a fair opportunity to prove itself on the racecourse is open for debate, but modelers can agree that its beauty and style epitomize the grand old days of air racing.

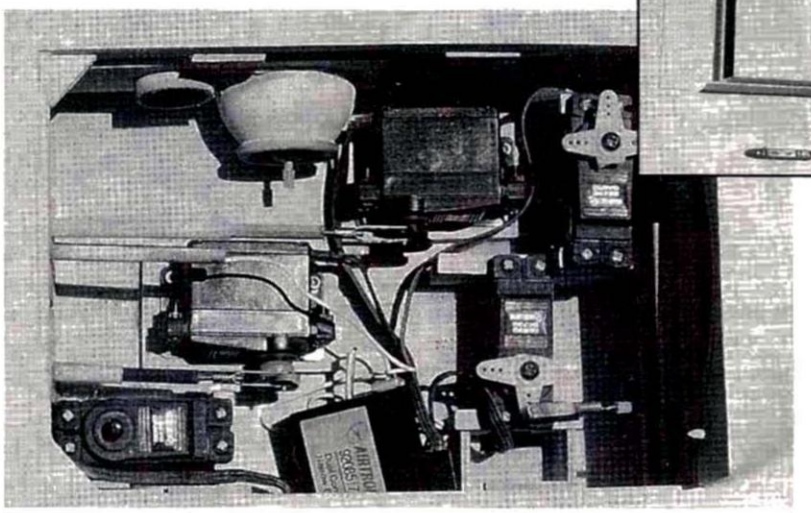


Information taken from "The Golden Age of Racing," Schmid and Weaver, Times Printing Co., 1991.

Scale TECHNIQUES

by BOB UNDERWOOD

HIDING PLACES



From top left counterclockwise: tubing to accommodate Y-connectors for flap and aileron servos mounted in wing; air tank for retracts; elevator servo and pushrod; bomb-drop mechanism and servo; throttle servo; receiver with antenna threaded through tubing; retract air-valve servo (valve not in place yet); rudder servo and pushrod. A 1200mAh battery is in the nose under the fuel tank. Top right: a fake radiator covers the hole!

WITH SCALE R/C models, you always have something to hide! No, it's not your workmanship. Some things, like mufflers, cylinder heads and antennas, don't have to be hidden. Although the rules allow you to let these objects "hang out," there's always a risk that a judge simply won't allow his eyes to move from these foreign objects, and all the psychology in the world won't change his bias.

The problem becomes even more complicated when you start figuring out where to put things like servos, the receiver, air tanks, batteries and the zillion other pieces of "stuff" that make an R/C model fly. Bear in mind, you do *not* want make the cockpit look like a bathtub filled halfway with a floor so the pilot figure is amputated somewhere around its waistline! You also have to be able to get to this "stuff" for a multitude of reasons, not the least of which is that it sometimes needs servicing. Last, but not least, it will help to position the "stuff" somewhere near (or forward of) the CG. Placing a pound of it about an inch ahead of the stab is a "bad thing"!

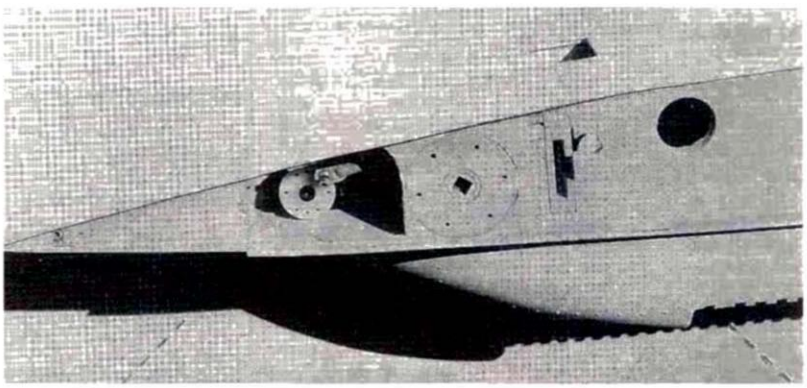
In most of the models you've built, there was probably a nice rectangular box that accommodated everything in a neat little bundle. Usually, three servos could be placed next to one another and were easily connected to the proper surfaces; the aileron servo was snuggled neatly in the center section of the wing. This probably wasn't the case in your recent scale project.

As models have gotten larger, the one-piece wing has given way to a center section that's permanently attached to the fuselage and outer panels that are plugged into the center section. You can usually install the bulk of your equipment in that center section, incorporating a removable cover for access. Panel lines can serve as the separation points for the cover. Depending on the depth of the wing center section, you may actually be able to place the servos in a vertical position. If you can't, lay them on their sides.

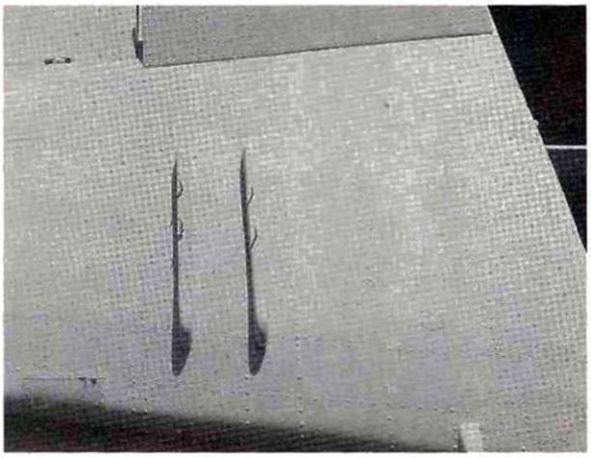
Many models contain unique places to hide radio gear. These may include actually putting them *inside* dummy pilots, providing them with electronic innards. Under seats is a popular place as well. The only things that limit your options are your imagination and your commitment to expending the time and energy to tough out the solution.

The accompanying photos show elevator, rudder and throttle servos in fairly typical locations. In addition, there are servos for a bomb drop and a retract air valve. The receiver, which will be wrapped in foam, is tucked into a wing cavity. The air tank for the retracts is in a similar position on the opposite side. Everything is easily accessible, and there's actually room for other items. It is all covered by a dummy radiator.

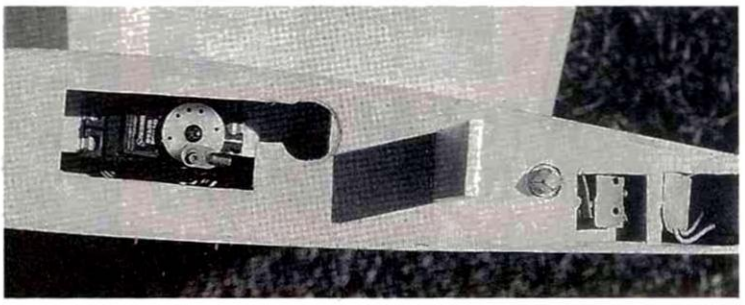
The aileron servos are in the outer plug-in panels. Admittedly, they are a



One of the two flap servos mounted in the wing center section. The round fitting with the square drive is a Byron* unit that's plugged into the outer flap. The slot is for a metal wing joiner that's accessed through the landing-gear nacelle. The rectangular hole on top of the wing is for access to the gear cylinder mount. The round hole is for the aileron servo lead to pass through.



The bottom panels are painted light blue, and rivets and cover panels are evident. Yes, the rivets are a lot of work. There are probably 20 to 25,000 on the model, but who's counting? The rocket rails are in place.



The outer wing panel with aileron servo and hole for the servo lead to pass through. To the rear is the square Byron drive plug-in for the outer panel flap, then a microswitch and 9V battery for landing-light actuation (a RAm system is used).

little harder to get to, but they keep linkages short, and they are out of sight. The flap servos are in the center section in a similar position.

Running the wires through the wing ribs is simple enough. Make a tube out of light tagboard by rolling it around a dowel and taping it. Then feed the wires through the tube to the receiver. In earlier days, longer extensions often had to be electronically enhanced, but this is less of a problem with newer receivers. If you have any doubts, consult the radio manufacturer.

To carry out some of these hiding ideas, you may have to develop interesting servo mounts. I often use 1/4-inch-thick plywood triangles as mounting pieces glued to 1/8-inch lite-ply plates. These can be glued in place or anchored by screws to a second plate. A critical point is the need to be able to reach the screws, servo arms and linkage. For certain applications, make note of the special servos provided by most manufacturers. The low-profile type is very handy and works well in wings.

It's very important to anchor servo-extension leads at their connection points. Several manufacturers have molded-plastic clips that keep the connectors firmly attached. This is of prime importance where the servo leads have an extension connection inside a tube in the wing. The simple action of removing the wing panel can place a strain on the lead and connection points.

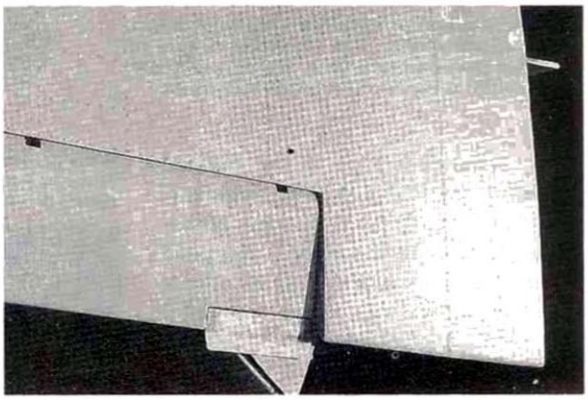
While I know of many scale modelers who do it, I always refrain from mounting servos using double-sided tape. This isn't only a carryover from earlier days when manufacturers discouraged this technique, but just that I don't feel comfortable relying on the sticky stuff to hold.

Another urge you should resist is that to use very small, low-torque servos on primary surfaces. Play the torque game and be certain not to overload the output. Of course, certain applications, such as throttle and retract-valve actuation, may easily employ the smaller servos.

In some cases, it is necessary to position the battery pack some distance from the switch harness or receiver. If this requires an extension, be sure to use wire of adequate gauge. This is especially important if you run a large number of servos and a large-capacity pack. Sometimes, we forget that as the servo count rises, the current drain often overtaxes the smaller wires and battery packs. In earlier days, five or six servos were the norm; now, we find eight to 12 fairly common.

A major concern is the placement of an adequate muffler. This has been the greatest challenge for a number of my subjects. I am not prone to contracting someone to have a custom unit developed and, as a result, I often resort to some jury-rigged, home-brewed concoction that *sometimes* works. Some subjects, such as the thin-nosed Russian IL 2, just don't easily lend themselves to providing the space required, especially for a side-exhaust engine. This caused me to learn how to silver-braze. I also found an excellent source of header material in the form of copper water-pipe fittings. Combine this with thick brass stock and you can produce all sorts of interesting assemblies. A hacksaw, files, a Dremel* tool and a propane torch are all the "complicated" tools you'll need.

The process of developing a scale model presents many challenges. A primary goal is to create the illusion that the model is a true reproduction of its full-size counterpart. Eliminating the unrealistic bulges, wires, fittings, etc., that contain the R/C "necessities" is a major portion of that challenge. If the subject is worth doing, it's worth doing correctly.



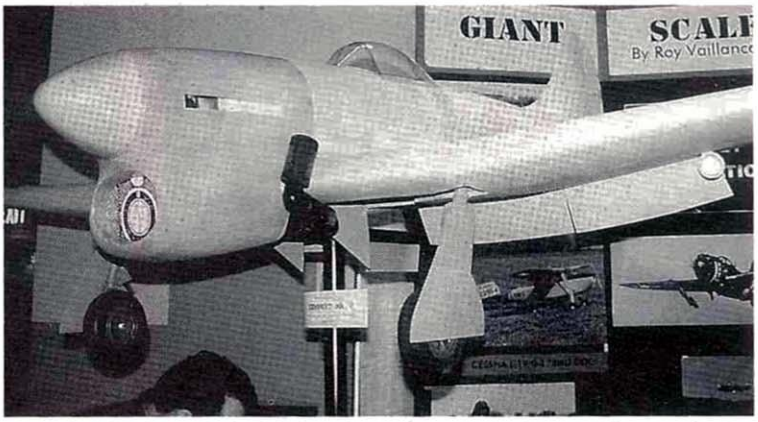
The top of the outer wing panel in primer is awaiting its two-color camouflage scheme. Rivets are clearly visible. An FTE* applicator with a fine tube needle was used to apply glue drops (RC 560). Remember, RC 560 dries clear, so the primer color underneath it will show through. Yes, the ailerons are built up and covered with Coverite* and K&B* primer.

**Addresses are listed alphabetically in the Index of Manufacturers on page 118.*

Thinking BIG

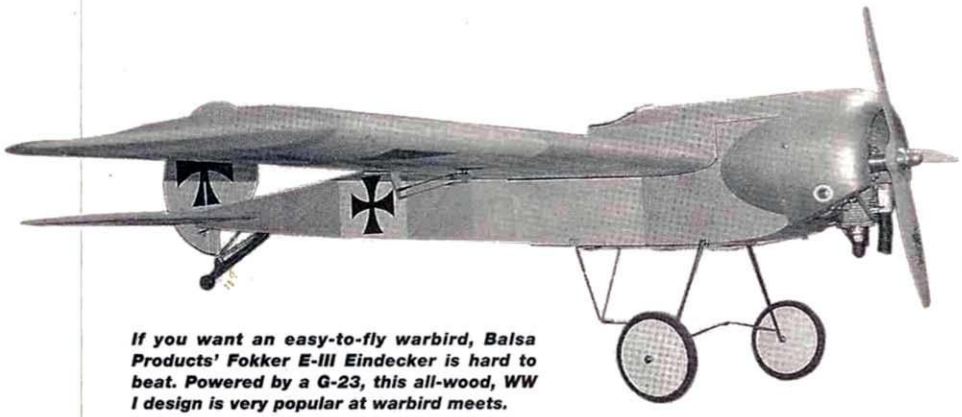
by GERRY YARRISH

WRAM SHOW HIGHLIGHTS



At the WRAM show, Vailly Aviation always seems to have something new for the giant warbird fans. Here is their new Hawker Tempest Mk V.

THE LONG-ESTABLISHED WRAM show held each February in Westchester County, NY, is *the* model show for many Northeast modelers. I have been attending this winter trade show for as long as I can remember; my dad took me there long before I was old enough to drive. And it was at the WRAM show where I was first introduced to big models. For the 1998 show, I thought I'd bring my camera along and give you the "Thinking Big" view.



If you want an easy-to-fly warbird, Balsa Products' Fokker E-III Eindecker is hard to beat. Powered by a G-23, this all-wood, WW I design is very popular at warbird meets.

Whenever I go to the WRAM show, my first stop is the static display area. Seeing all those giant-scale birds in one place is just plain cool, and this year was no exception. It is interesting to note that there wasn't a giant-scale category this year. Nowadays, most of the models entered in the static competition are very big, so it makes sense. Here are some of the new models I saw.

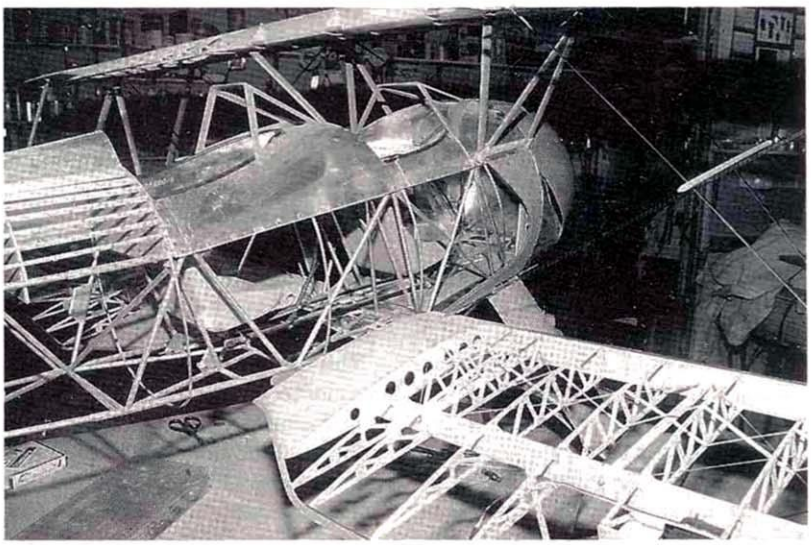
Bob Pickney won the airplane Best in Show award with his Fairchild T-31. Painted in silver and just alive with rivets and surface detail, Bob's model was indeed a showstopper. I'm sure we'll see a lot more of this G-62-powered model throughout the year.

Greg Hahn took the Post-WW I Military award with his new Ziroli* P-38 Lightning. As with all of Greg's models, his Lightning was beautifully executed and had many unusual features. Greg installed servo-driven, proportional Fowler flaps in his model. Power comes from a pair of Zenoah* G-38s, and the model sits on top of Glennis* tires, wheels and brakes.

In the WW I category, victory went to John Goodrich with his RAF BE2C biplane. I'm just a pushover for WW I models, and John's 1/6-scale reconnaissance bird did me in. With a wingspan of 73.6 inches and weighing 10.75 pounds, this model should be perfectly powered with its O.S.* .70 4-stroke engine. John tells us that there are 69 Proctor* turnbuckles holding all those cables and flying wires in place.

One of my favorite subjects, the Pitts-designed Samson biplane, was built by Henry Schietrumpf. Henry drew his own 1/4-scale plans for this unique biplane and powers his 35-pound model with a Zenoah G445 twin-cylinder engine. The model has

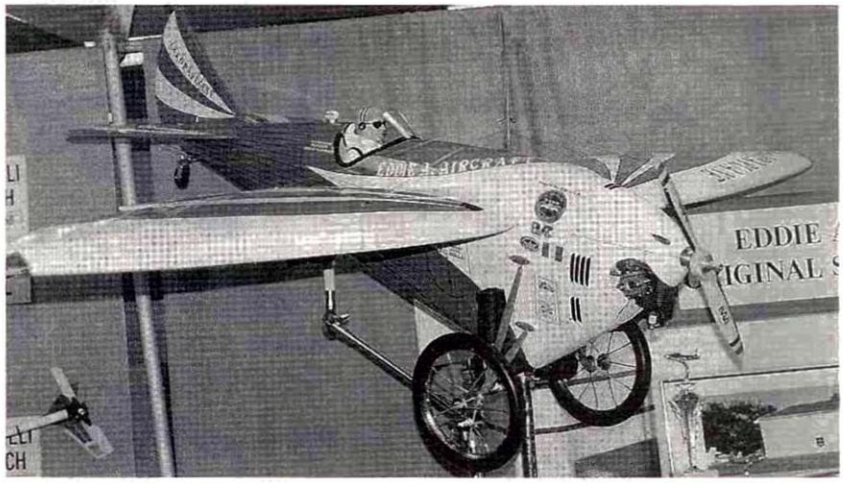
Graeme Mears showed his as-yet-unfinished WACO UPF-7. Truly a miniature aircraft in every sense of the word, the airplane weighs 55 pounds and will be powered by a Seidel 7-cylinder, 175cc radial engine. Everything is scale.

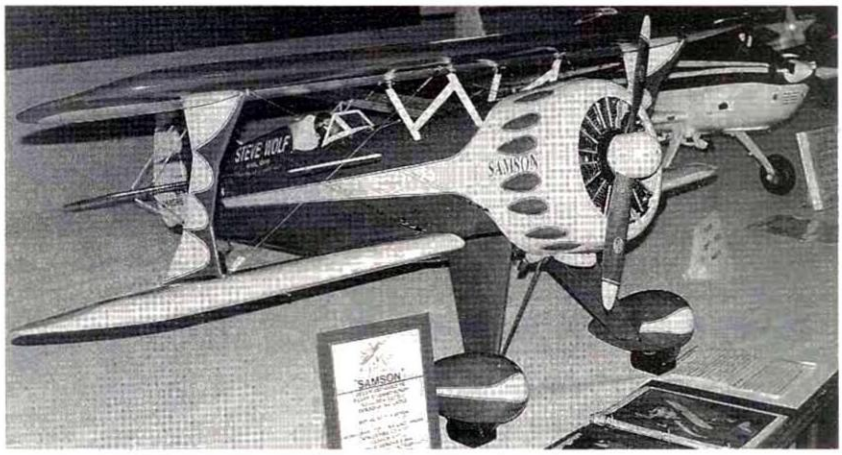


a 72-inch wingspan and earned him the Best Civilian award.

On display—but as yet unfinished—was the work of Canadian scale guru Graeme Mears in the form of a beautiful 30-percent-scale WACO UPF-7. Too complicated to be considered just a model airplane, Graeme's WACO is a miniature aircraft in every sense of the word. Weighing 55 pounds, the WACO has a wingspan of 108 inches and when finished, the "model" will be powered by a Seidel* 7-cylinder, 175cc radial engine. The fuselage frame is made of stainless-steel tubes that have been silver-soldered together. Graeme used aluminum and other metals extensively in this project to keep it as close to exact scale as possible. The ribs are built up in truss fashion, and the horizontal stab is adjustable with a jackscrew arrangement. Not only is the arrangement scale, but it is also hooked up to a feedback pot to control a servo which actuates the jackscrew. And, of course, all the cockpit controls work just like the full-size aircraft. What a shame to cover and finish all this workmanship.

There were several other outstanding models in the static display area, but I just do not have enough space to mention every one. I am sure we will bump into these guys again as the year continues. See the winners' chart for the rest of the scale winners.





Above: called the Jalopaplane, this unique airplane was in the Eddie A. Aircraft booth. Power comes from a G-23. Below: the Best Civilian award went to Henry Schietrumpf for his Samson biplane. The 35-pound, 1/4-scale model is powered by a Zenoah G-445 twin-cylinder gas engine.

WRAM SHOW SCALE WINNERS

NAME	AWARD	PLANE
Bob Pickney	Best in Show Airplane	Fairchild T-31
Greg Hahn	Post-WW I Military	P-38 Lightning
John Goodrich	WW I Military	RAF BE2C biplane
Roy Vaillancourt	Designer Scale	FW-190
Henry Schietrumpf	Best Civilian	Samson biplane
John Scolof	Golden Age	Bucker Jungmeister
Morris Pittorie	Standoff Scale	Curtiss Jenny

Post-WW I Military winner Greg Hahn displayed his Zenoah G-38-powered P-38 Lightning. Greg added scale functioning Fowler flaps to the Ziroli-designed model.

NEW STUFF

Just as exciting as the static display models at the WRAM show are all the new products shown by the vendors. Some of the new stuff that caught my eye this year included Roy Vaillancourt's new Hawker Tempest Mk V from Vailly Aviation*. Roy's new giant warbird has a 96-inch wingspan and about 1,932 square inches of area. Designed for powerplants in the Zenoah G-62 to Quadra* Q75 size range, the Tempest is typical of all Vaillancourt designs. Its basic construction is balsa, ply and lite-ply, and Roy has available plans, a fiberglass cowl, an aluminum spinner and a clear plastic canopy. A scale tailwheel and landing-gear struts are also available.

Though not exactly brand new, I saw a G-23-powered Fokker E-III Eindecker in the Balsa Products* booth. I've seen a couple of these models fly, and they are just the ticket

for someone who wants an early-bird fighter. With a wingspan of 85 inches, the model is lightly loaded and much fun to strafe the troops with. Traditional wood construction is used throughout and control functions include non-scale ailerons.

The Aero Craft folks showed off their new, really big Staudacher 300S. That's Doug Logan (left), company owner, and pilot John Kohler saying "cheese" for the camera.

In the Aero Craft* booth were Doug Logan and show pilot John Kohler showing off Doug's big models of the Staudacher 300S. Available in two sizes (36 and 30 percent), the 300S features lightweight construction with plug-in wing panels. The smaller version has a 90-inch wingspan and is ideally suited for a Zenoah G-62. The bigger brother has a span of 105 inches and flies behind a 3W-80 powerplant from Desert Aircraft*. Performance of these aircraft is awesome!

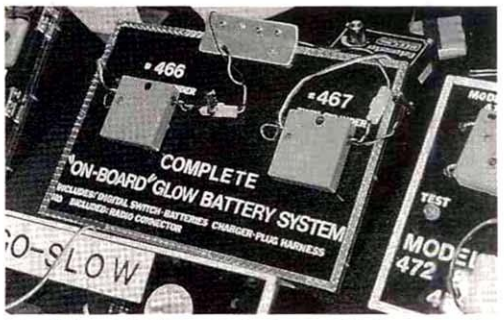
A unique airplane at the show was a great-looking sport model called the Jalopaplane from Eddie A. Aircraft*. Designed by Eddie Ajamian, this pseudo-scale monoplane has the feeling of the 1920s about it and is really an eye-catcher. Complete with oversize spoked wheels (à la baby carriage) and a lively paint scheme, this airplane is designed for a Zenoah G-23. If you are bored with run-of-the-mill big birds, the Jalopaplane could be just right for you.

How's this for attention to detail? "Best in Show Airplane" winner Bob Pickney's Fairchild T-31 is alive with cockpit and surface detail.

In the WW I Military category, victory went to John Goodrich with his RAF BE2C biplane. John's 1/6-scale reconnaissance bird is powered by an O.S. .70 4-stroke engine.

ON-BOARD GLOW ACCESSORIES

I am presently building a Lanier* Ultimate Pitts and will be powering it with an O.S. 1.20 4-stroke engine. To keep the engine happy, I've decided to install an on-board, glow-battery system to keep the plug lit at lower throttle settings. McDaniel R/C* had a booth full of accessories for me to check out, and I found a really neat system. The new model no. 466 On-Board Glow Battery System includes a digital switch that you can adjust so the system comes on at whatever throttle setting you would like. Complete with a battery pack, charger and plug harness, the system is compact and should be very low maintenance. The system is also available for twin-cylinder engines. Once I get the Ultimate Pitts built, I'll give you a report on how the new glow system works.



The McDaniel R/C booth is always full of accessories for the big-bird modeler to check out. If you run glow engines, the new model no. 466 On-Board Glow Battery System comes with a digital switch that you can adjust to come on at any throttle setting.

Well, that's it for this time out; keep those cards and letters coming in and remember: keep thinking big.

**Addresses are listed alphabetically in the Index of Manufacturers on page 118.*

Golden AGE OF R/C

by HAL deBOLT

GOING THE DISTANCE

The Pack Rat aviation team is made up of (left to right) Ron Clem (builder), Bob Murphy (fuel tank and parts fabricator), Jim Isabella (backup pilot) and Bill Clem (driver, supporter and Ron's brother!).

WE'VE SPENT SOME time recently discussing how R/C began and revisiting multi-control reed systems and proportional controls and how they compare with modern R/C. Although we talked about all of this many years ago, new people have since joined our ranks, so we'll make time to review it all in future columns. This month, however, your OT R/C place needs attention!

OT R/C'er Ron Clem of San Diego, CA, tells us that he and his Pack Rat team have recently managed to eclipse Maynard Hill's world distance record with nearly 500 miles of nonstop flight! Shortly thereafter, Maynard raised the distance again; sounds like some friendly competition is brewing!

Ron and his team have visions of adding considerably to that record. Engine problems have frustrated them so far, but knowing their persistence, I'm sure the difficulties will be solved soon.

Ron points out that in the past, an energetic modeler could establish a record by himself, and often with little effort. Over time, however, the records have grown to such an extent that often the effort required almost parallels that of a NASA project! No longer is one man's ability sufficient; as NASA has demonstrated, a team effort is required. Several of Ron's team members have engineering degrees and experience, and one is an honest-to-goodness rocket scientist! Ron reminds us that without the incredible efforts of many accomplished assistants, it would be almost impossible to set new records. The aircraft is obviously the number-one need, but it goes beyond that with the need for a suitable venue, predicting weather, officials, hands-on helpers, etc., with all requiring substantial personal time and ability. A major effort can become a folly with the lack of a simple detail.

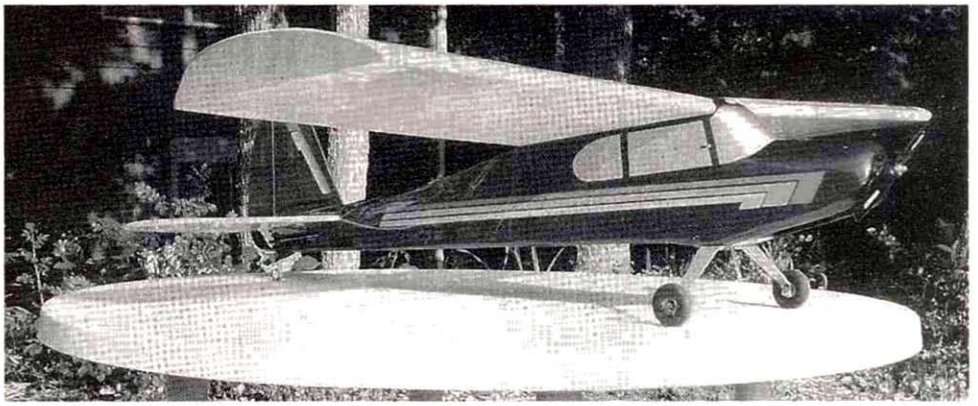
The Pack Rat team meets in January of each year to establish objectives, and they also participate in the Marathon of Flight competition held in Baker, CA, each March. Events there include "limited fuel" closed-course distance in various categories, most unusual craft to successfully fly, etc. To say their performance has been outstanding would be putting it mildly. The team thinks the power and fuel economy of a diesel engine are distinct assets for distance flying. The team's only problem is to keep the diesels running for the many hours involved!

Ron concludes by reminding us that it takes a team effort to accomplish these R/C tasks that have never been done before. When things do not go as desired, it brings out the best in all of them, and they enjoy the challenge. Something others might consider?

A true modeling pioneer and a fine gentleman, Henry (H.A.) Thomas flies his latest while Ken Makepeace indicates one up!

OT BULLETIN BOARD

It's nice to keep track of what our pioneers are doing these days. One who has been a friend for many, many years is Henry (H.A.) Thomas of Little Rock, AR. In the very early days, Henry educated us with his professional sketches of planes, engines, controls, radio systems and other



Gerry Dale's electric-powered replica of his first R/C plane, an LW Champion. It's a pretty bird.

modeling gadgets in the magazines. Henry is now in his 80s, and I welcome input from Ken Makepeace of El Dorado, AR, who visited Henry and provided a photo of him at his transmitter. It's so good to know he is still flying!

In other news, Mickey Walker, the visionary founder of the Senior Pattern Association, has encountered some physical problems that required him to turn over the leadership of the growing organization to Ronald Reed, 3430 Corral Dr., Marietta, GA 30066. The SPA is a good show; check it out!

A while back, we discussed Carl Goldberg and his doings. This surprised Robert Fabian of Mountain Home, AR, who tells us he was a longtime friend of Carl's. Among others, the two were founding members of the Suburban Aero Club of Chicago. (Does SAC have a familiar ring?) Robert tells us that Carl asked him to build the prototype Senior Falcon from stock wood and plans and test-fly it. (Robert notes that the initial flights were great *after* the aileron movement was reversed! Apparently, the fact that we still steered with rudder in those days saved the Falcon. For quite a while, ailerons were only used for rolls.) Robert wrote to tell us that the published photo of Carl holding that same Senior Falcon brought back some fond memories.

Gerry Dale is another modeler who writes with fond memories of yesterday. Gerry's involvement in R/C began in Montreal, Canada, with single-channel escapements and a prominent model of that time, the Live Wire Champion. Nostalgia set in after Gerry retired, and he decided to build another Champion, but he added a modern twist by using an AstroFlight 05 motor and 14-2000mAh cells. Gerry says the replica matches the weight of the original at 4 pounds and tells us that the Champion's flight performance is as great as its predecessor's was 35 years ago, with 12-minute flights common. I call that an inspiring good show!

Bob Wilkinson— **Then and Now**

OT R/C'er Bob Wilkinson is now enjoying his recently completed YS 1.20-powered Spitfire.

Bob Wilkinson of Atlanta, GA, is another OT R/C'er to add to our "What OT R/C'ers are doing now" theme. Bob sure fits the bill!

At age 64, Bob has been modeling since his seventh year, when he was encouraged by his father. In the '40s and '50s, he was active in control-line speed and stunt events (now called "aerobatics"!) in western Pennsylvania. He recalls that as a junior entrant, he competed in contests where I did well in the open class. His McCoy .29 Speedwagon easily qualified him for the '50 and '51 Plymouth Internationals in Detroit.

Bob was attracted to R/C in the early '60s, and his first R/C model was a K&B .09-powered Live Wire Trainer controlled by a radio built for him by some friends at Westinghouse. The radio had a ground-based transmitter and a tube, plus a transistor receiver—unique for those days. Bob says it worked about half the time, apparently long enough to learn the fundamentals. Bob indicates that he has built 127 models since then, and he now enjoys everything from ½A to ⅓ scale. Current effort is a YS 120-powered Spitfire.

As a tribute to Bernie Murphy, Bob Wilkinson built a replica of the LW Trainer Bernie taught him with way back when. Well done!

As a tribute to his friend Bernie Murphy, former associate editor of *RCM* and Bob's flight instructor so many years ago, Bob recently built a replica of his first LW Trainer from plans he had saved all these years!

The replica now has completed 20 uneventful and most enjoyable flights. Powered with an O.S. .10, it uses only rudder and engine control. Bob says going back to rudder-only is interesting, different and fun—especially with a modern radio that keeps working!

It's hard to think of R/C any other way; Robert Wilkinson is an excellent example!

LATEST PRODUCT RELEASES

DUMAS PRODUCTS INC.

Mr. Mulligan

This 30-inch-span, rubber-powered model kit comes with more than 75 laser-cut wood parts and includes: decals; a 9-inch prop; rubber, vacuum-molded parts; and colored tissue. Call Dumas for a complete information packet on their entire line of airplane kits.

Kit no.—303; **price**—$36.95.

Dumas Products Inc., 909 E. 17th St., Tucson, AZ 85719; (800) 458-2828; (520) 623-3742; fax (520) 620-1329; email: dumas@azstarnet.com.

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SPEEDTECH INSTRUMENTS

Skywatch Elite

This Swiss-made wind meter accurately measures current, average and maximum wind speed; current, minimum and maximum temperature; and wind chill. It has a compass and a Beaufort scale and measures in knots, mph, m/sec. and Fahrenheit and Centigrade. Automatic shutoff after 36 hours allows statistical sampling of wind speed and temperature. It's powered by a 25+ year lithium battery, is weatherproof and comes with a protective cap.

Price—$125.

Speedtech Instruments, 10431 Deerfoot Dr., Great Falls, VA 22066; (800) 760-0004; (703) 759-0511; fax (703) 759-0509; email: info@speedtech.com; website: www.speedtech.com.

TETHERITE PLASTIC PRODUCTS

Hold Fast

This wing-bolt anchor system features glass-filled nylon anchors with aluminum inserts, nylon wing bolts and anti-torque support dowels. It comes in high-wing, low-wing and two- and four-bolt configurations for symmetrical and semisymmetrical wings.

Part no. TTPO7; **price**—$3.50/pkg. (two-bolt system), $5/pkg. (four-bolt system).

Tetherite Plastic Products, P.O. Box 57784, Webster, TX 77598-7764.

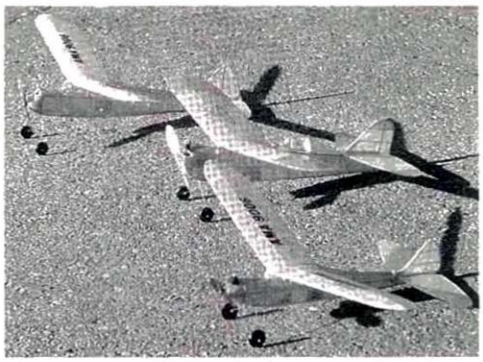
GREAT PLANES

The Dazzler

This all-wood sport aerobatic model has a nearly symmetrical wing for stability and dual aileron servos for faster response time. Specifications: wingspan—48 inches; wing area—578 square inches; weight—3.5 to 4 pounds; length—43 inches; engine required—.32 to .40 2-stroke; radio required—4-channel with five servos.

Part no.—GPMA0480; **price**—$99.99.

Great Planes Model Distributors, 2904 Research Rd., Champaign, IL 61826-9021; (217) 398-6300; fax (217) 398-0008; website: www.greatplanes.com.



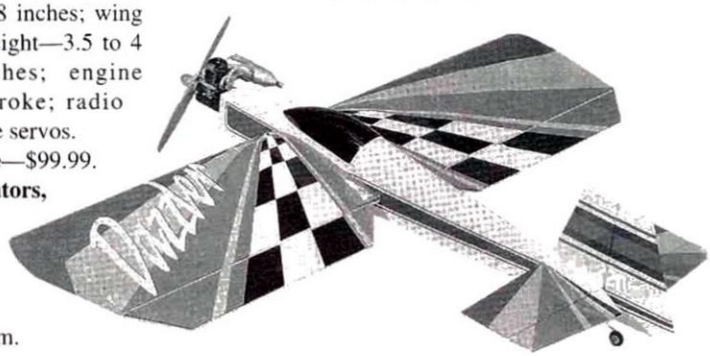
A.A. LIDBERG MODEL PLAN SERVICE

Series C Mini Old Timers

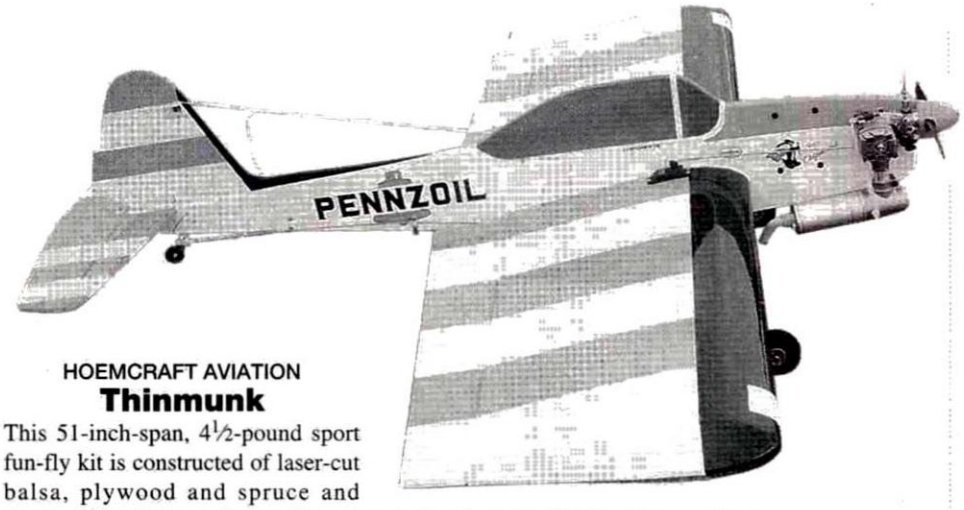
Shereshaw's Champion, Limber's Debby and Loutrel's GHQ Sportster are now available in one box, which comes with all necessary materials, including rolled plans, building instructions, printwood (balsa and ply for the motor mounts), sticks, block balsa, wire for landing gear, wheels, tissue and sheet acetate for the windshields. Great for rubber, electric, or CO_2 power.

Price—$35.

A.A. Lidberg Model Plan Service, 1008 E. Baseline, Ste. 1074, Tempe, AZ 85283; (602) 839-8154 evenings and weekends; email: aalmps@aol.com; website: members.aol.com/aalmps.



Product NEWS



HOEMCRAFT AVIATION

Thinmunk

This 51-inch-span, 4½-pound sport fun-fly kit is constructed of laser-cut balsa, plywood and spruce and comes with plans, an instruction manual, decals and a full hardware package. The Thinmunk uses a .40 to .46 engine for power.

Price—$79.95 (plus $7.95 S&H).

Hoemcraft Aviation, 1204 S. 4th, Independence, OR 97351; (503) 629-5277; website: members.aol.com/hoemcraft/aviation.html.

ASTROFLIGHT INC.

120 Power Supply

This small, lightweight power supply delivers 12.5 amps at 13.8 volts. It measures 7.8x4.3x2 inches, weighs 2 pounds and works from domestic 110 and 220 volts AC. It can be used with the AstroFlight Model 110D charger to charge 1 to 18 cells and Model 112D to charge 1 to 36 cells.

Price—$99.95.

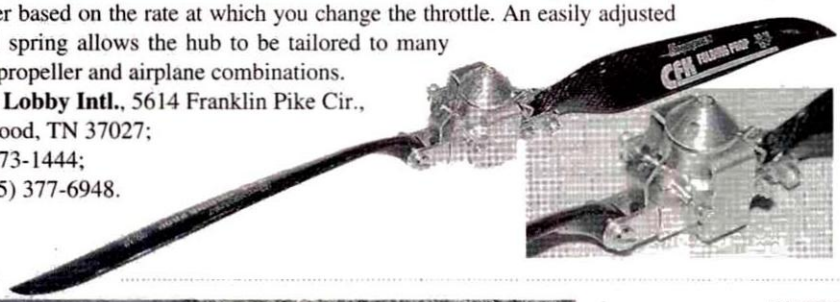
AstroFlight Inc., 13311 Beach Ave., Marina del Rey, CA 90292; (310) 821-0291; fax (310) 822-6637; website: www.astroflight.com.

HOBBY LOBBY INTL.

2-Pitch Hub for Electrics

A higher-pitch prop provides better cruise performance, and a lower-pitch prop provides better takeoff performance; this unique hub switches the pitch of your standard folding propeller based on the rate at which you change the throttle. An easily adjusted internal spring allows the hub to be tailored to many motor, propeller and airplane combinations.

Hobby Lobby Intl., 5614 Franklin Pike Cir., Brentwood, TN 37027; (615) 373-1444; fax (615) 377-6948.



IKON N'WEST

Stinson 108

This 72-inch-span model is a delightful flyer with a .45 to .50 2-stroke or .48 or larger 4-stroke. The kit features a fiberglass cowl and wheel pants, prebent landing gear, hand-cut balsa and plywood parts, a Stinson tail logo, airfoil-shaped struts, ⅛-scale drawings and an instruction manual. The model has a two-piece wing and wing flaps. Send $5 to Ikon N'West for a complete catalog of their kits.

Ikon N'West, P.O. Box 306, Post Falls, ID 83877; (800) 327-7198.

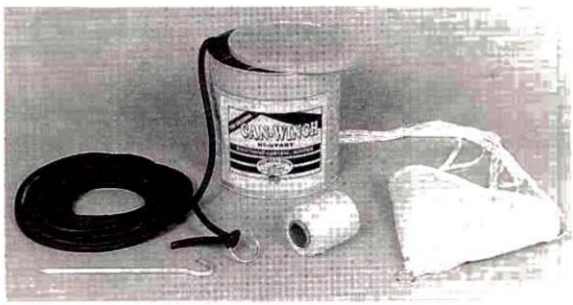
BUZZ WALTZ R/C DESIGNS

Original Can Winch

The Can Winch is 50 feet of ¼-inch-diameter black surgical tubing, 250 feet of line, a parachute and a ground stake. It has more than enough lifting power to launch a 100-inch-span sailplane.

Price—$45 (plus $5 S&H).

Buzz Waltz R/C Designs, 68-320 Concepcion Rd., Cathedral City, CA 92234; (760) 327-1775.



CLASSIFIEDS

BUSINESS

WWW.COPTERCORNER.COM, a full-service R/C helicopter site since 1978. Email: helifly@best.com. [8/98]

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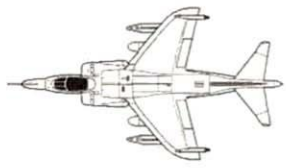

Name THAT PLANE

CAN YOU IDENTIFY THIS AIRCRAFT?

Congratulations to Jack Ultad of Sisters, OR, for correctly identifying the April 1998 mystery plane as the Mooney M-18 Mite. In the photo, test pilot Bill Taylor is putting 5 gallons of gas in the fuel tank in preparation for a 280-mile flight. The small plane weighed 450 pounds, could carry a 250-pound load and had single-lever control. Powered by a 65hp Crosley auto engine, the Mite could fly at more than 100mph, and its designer boasted that it could fly across the country on $12 worth of fuel (1948 prices, of course!). Our winner comments that he flew in a Mite on his commercial, solo, cross-country flight in 1952 and tells us that its retractable landing gear was powered manually.

Send your answer to *Model Airplane News*, **Name That Plane Contest** (state issue in which plane appeared), 100 East Ridge, Ridgefield, CT 06877-4606.

The winner will be drawn four weeks following publication from correct answers received (on a postcard delivered by U.S. Mail), and will receive a free one-year subscription to *Model Airplane News*. If already a subscriber, the winner will receive a free one-year extension of his subscription.

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ADVERTISER INDEX

GEARING UP

Matching propeller pitch to motor, plane and flying application has been the subject of endless discussion at the flying field and in the modeling press. Now the realm of experimentation—at least, with respect to pitch—has been profoundly expanded: Bob Kress of Kress Jets* has introduced a propeller whose pitch can be varied while the model is in flight.

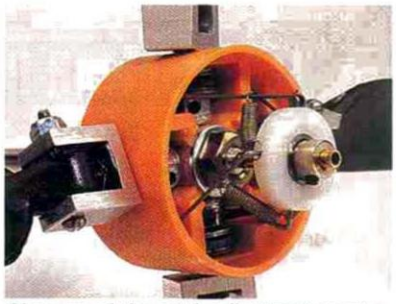
Coupled with a Modelair-Tech* H-500 reduction belt drive (the two units were designed to work together), Bob's invention offers two primary benefits: the highest feasible pitch at full throttle to maximize aircraft speed, and a suitably high pitch at low throttle to maintain an efficient flying speed while conserving power. And that's just the beginning; as we go to press, Kress Jets is introducing a small computer chip that provides automatic pitch adjustment for a true constant-speed propeller—running in your model!

Pitch adjustment is achieved by an inner, brass servo linkage tube that runs through a hollow stainless-steel propeller shaft. Inside the hub, small levers are attached to the brass tube via a bearing collar. When the pitch-adjustment servo pushes or pulls the tube, this motion adjusts the pitch of the blades, which—although attached to the collar—spin freely around the tube (see top photo).

Propellers are wings, and wings have pitching moments. This variable had to be neutralized to minimize current drain on the pitch-adjustment servo. Bob canted the angle of each propeller blade slightly forward on its yoke mount (effectively making the blades forward-swept wings!) to bring the center of pressure to a neutral point approximately three quarters of the length of the blade outward from the hub. Testing revealed that this approach reduced servo current drain from a level approaching that of a stalled servo to within normal operating current.

Propellers ranging from 8 to 16 inches in diameter can be used, although Bob cautions users not to exceed an rpm of 6 to 7 grand. Tom Hunt of Modelair-Tech similarly advises that total power input to the prop not exceed 300 watts (e.g., 10 cells x 30 amps). This means that the new unit is not a high-powered F5B system, but the benefits that can be gained are, nonetheless, potentially eye-opening.

Since the heyday of WW II fighter aircraft, it has been recognized that a pitch-to-diameter ratio of .7:1 is ideal for takeoff, and that a ratio of 1.5:1 is efficient for high-speed aerobatic flight. Consider the pusher configuration shown above. That 11x7 Aeronaut propeller approximates a 12x8 blade when mounted on the Kress Jets variable-pitch hub. Once in the air and with throttle opened up to 6,000rpm, the pitch can be extended to 18 inches (effectively creating a 12x18 prop). The feasibility of roughly approximating potential aircraft speed by multiplying pitch by rpm (with key assumptions about the drag of the particular aircraft) is well established.



Close-up of the pitch-adjustment mechanism in a 4-blade hub.

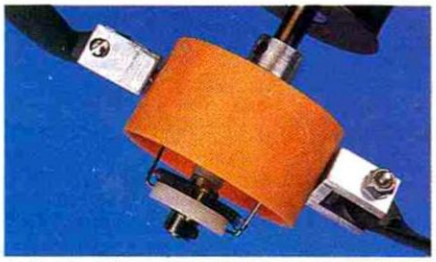
An Aveox* 1409/2Y motor is mounted to the Modelair-Tech reduction belt drive and Kress Jets 4-blade prop in a pusher configuration with blades folded. Note the brass pitch-adjustment tube protruding from the reduction belt drive.

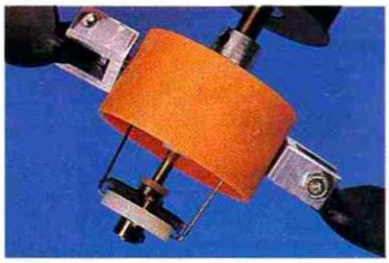
An AstroFlight* 05 motor is mounted to the reduction belt drive and the 2-blade variable-pitch hub. The pitch-adjustment linkage can be seen (brass tube) near the motor.

At 6,000 to 7,000rpm and with a pitch of 18+ inches, a low-drag aircraft such as a flying wing would be expected to attain speeds of above 100mph. Throttling down while maintaining a higher pitch will avoid causing the prop to act as a speed brake and will keep the aircraft "on step" (thereby avoiding the induced drag associated with a higher angle of attack). Coupled with today's 2,000mAh Ni-Cd cells, the duration of such a plane's flight could be remarkable.

Kress Jets offers a 4-blade prop intended to allow the use of additional power where ground clearance is an issue. (If you're curious, the 2-blade hub with blades lists at $49.50, and the 4-blade hub, for $79.50; the computer chip lists separately for $79.50; the H-500 belt drive lists for $49.95.) The microprocessor add-on for a constant prop speed will allow you to run your motor at its most efficient speed throughout a flight. Brushless motors add further efficiencies. Have the enticements to experiment with electrics ever been greater?

—Tom Atwood





Left: the 2-blade prop hub with the blades adjusted at low pitch for takeoff. Right: hub adjusted for high pitch.

**Addresses are listed alphabetically in the Index of Manufacturers on page 118.*